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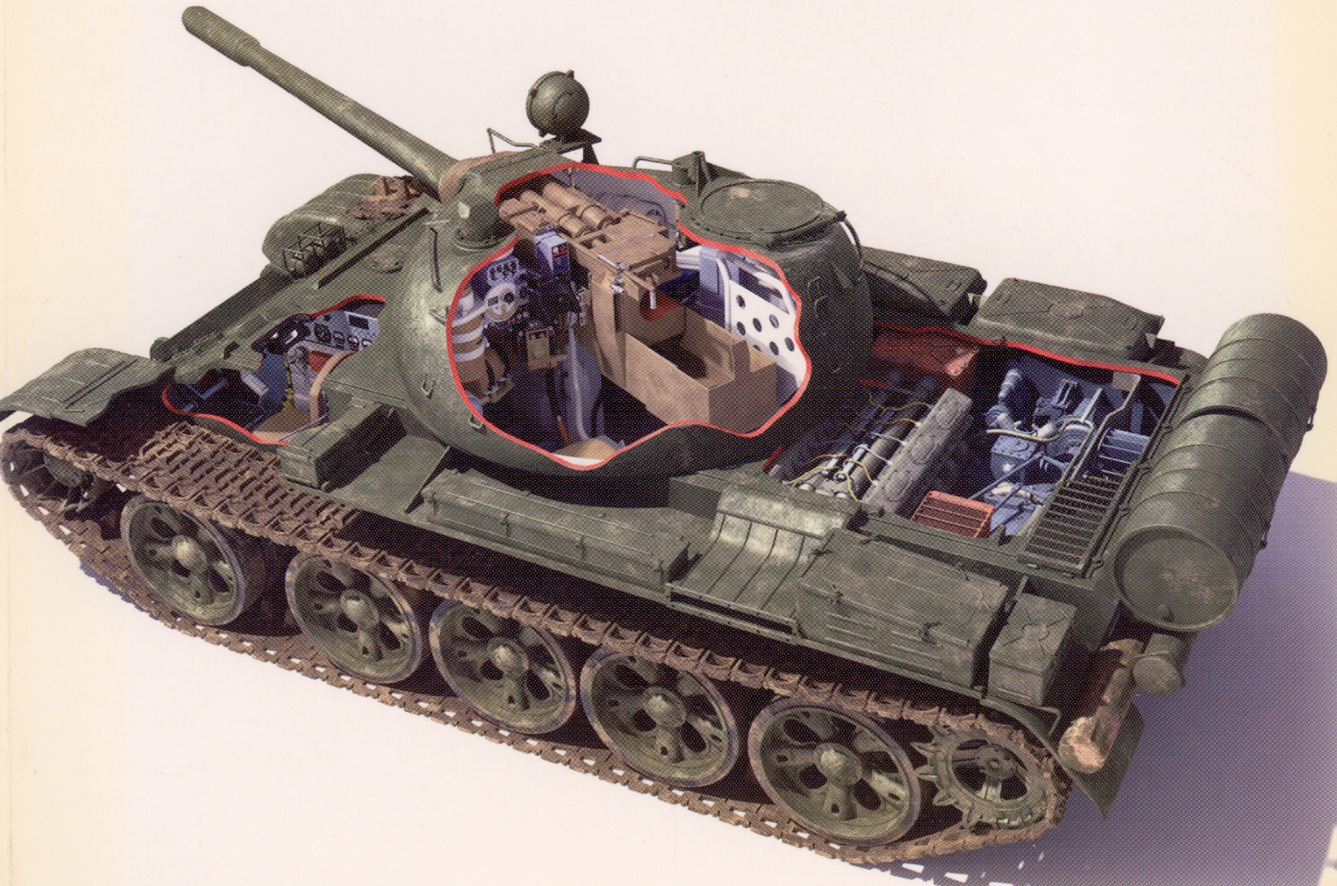
T-54 and T-55 Main Battle Tanks 1944–2004



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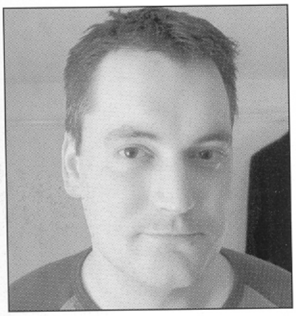

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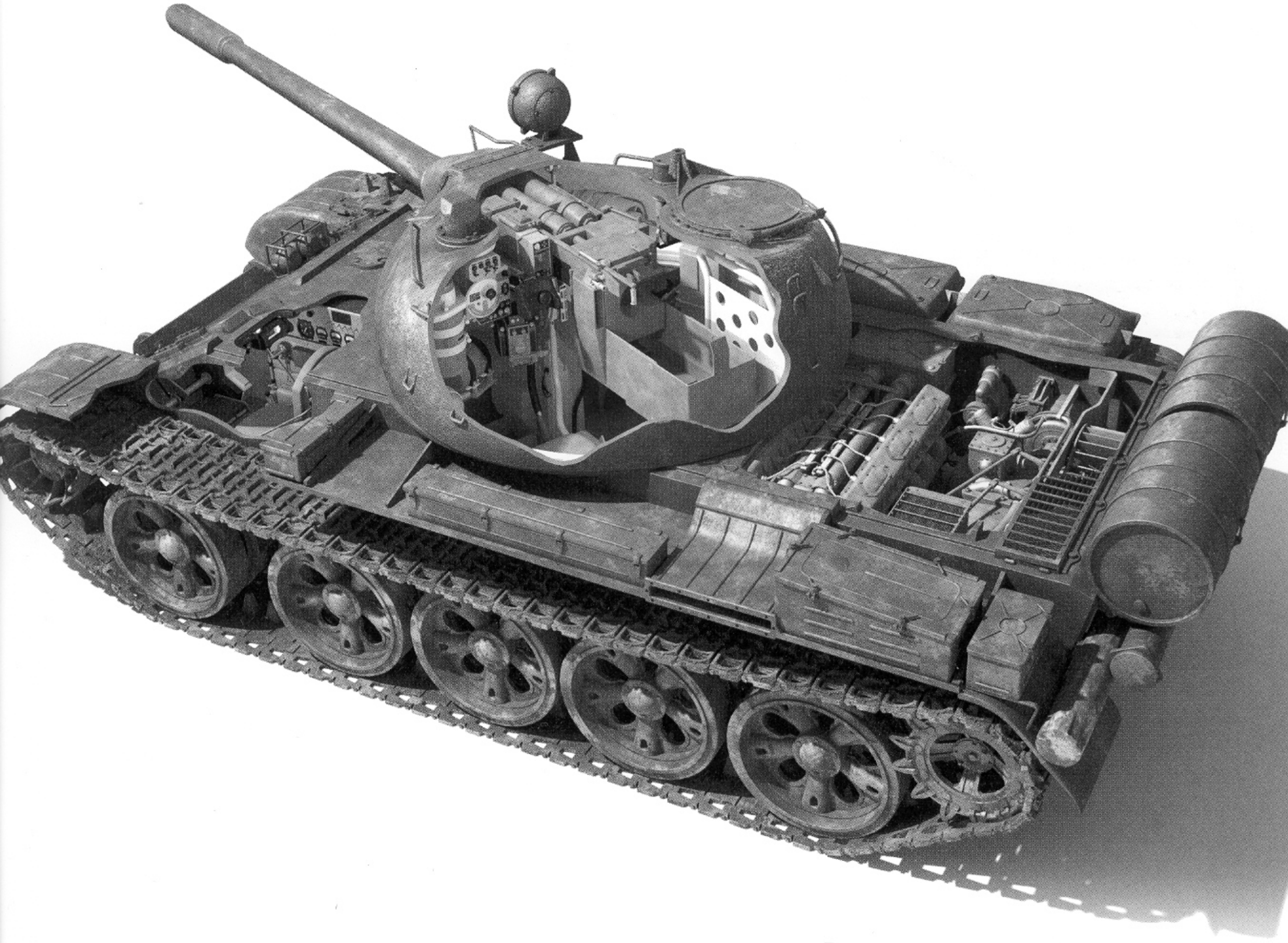

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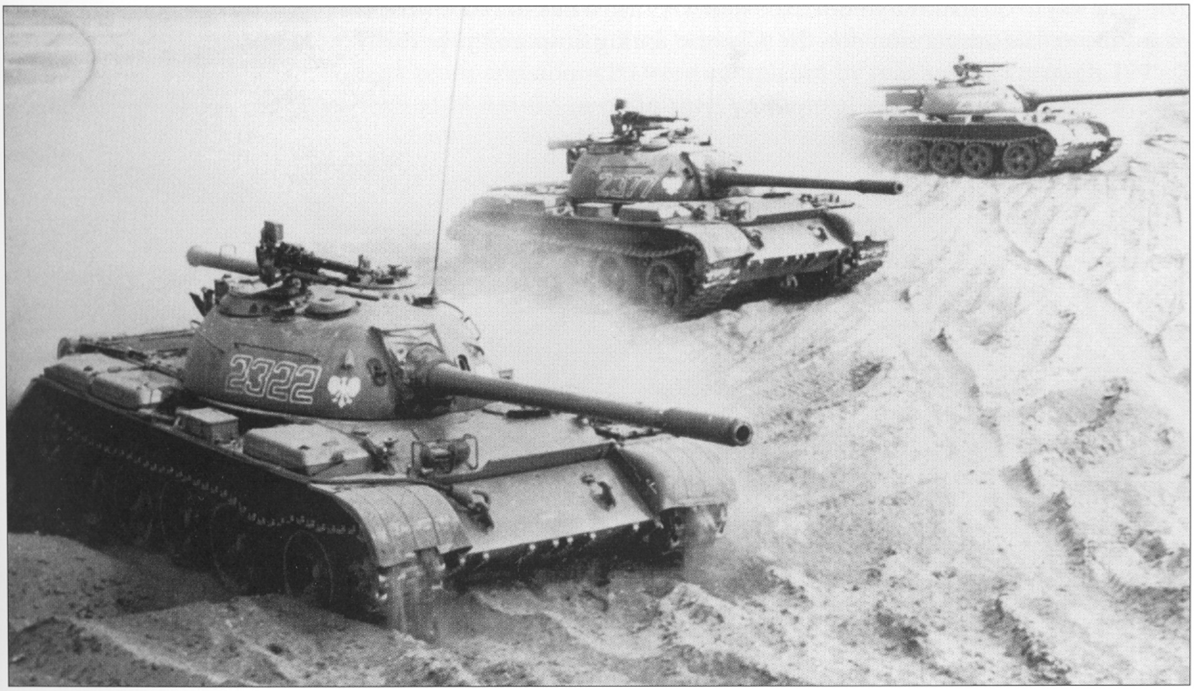
T-54 AND T-55 MAIN BATTLE TANKS 1944–2004

INTRODUCTION

The T-54/T-55 family of tanks are the most important tanks of the post-World War Two period if only because of the sheer number manufactured. The T-54/T-55 family is also important for its extensive combat career over the past half-century. It was widely exported to nearly all regions of the globe and has become almost as ubiquitous as the Kalashnikov assault rifle. Beginning with the invasion of Hungary in 1956, the T-54 and its derivatives have seen combat in nearly every major conflict including the Arab–Israeli wars of 1967, 1973, and 1982, the Vietnam war of 1967–75, the Iran–Iraq War of 1980–88, the Afghanistan conflict, Operation Desert Storm, the Yugoslav Civil Wars, the wars in Africa, and the recent conflicts in Iraq. Although outdated by current standards, the T-54 and its derivatives are still widely deployed around the globe and are likely to remain in use for decades to come. Due to the immense nature of this subject, the focus here is on the tank versions of the T-54/T-55 family. The vast assortment of specialized derivatives, including armored recovery vehicles, bridge-layers, engineer vehicles, cranes, and other specialized types, have been omitted due to the limited space of this book.

The icon of the Cold War confrontation in Europe is the T-54 tank. No other Cold War tank was built in such large numbers by so many countries, or saw service in so many conflicts. These are Polish-manufactured T-54A tanks in service in the early 1960s still wearing the older style of national insignia, the white Piast eagle. (Janusz Magnuski)

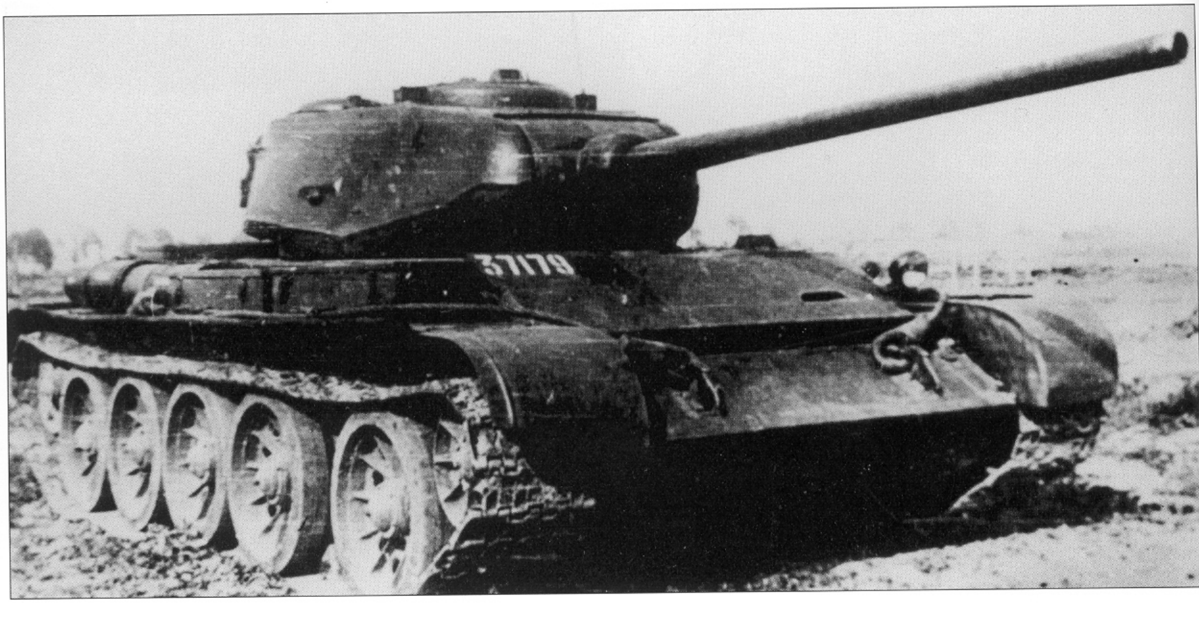


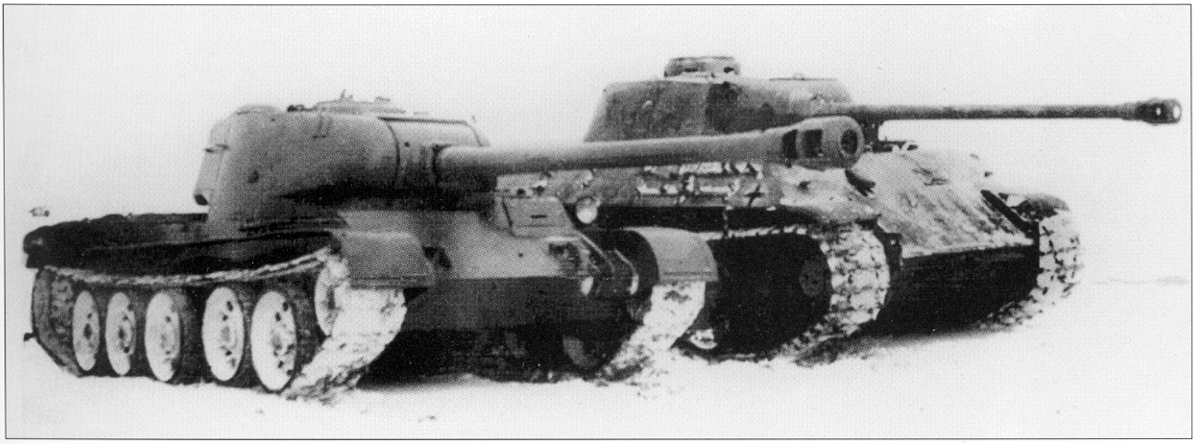
LEGENDARY ORIGINS

Although the T-34 medium tank was one of the most legendary weapons of World War Two, the Red Army was dissatisfied with it almost from its introduction into service in 1940. One of the most significant problems was its archaic Christie suspension which used a bulky set of large springs that took up an excessive amount of space inside the fighting compartment. The first effort to switch to a more compact torsion bar suspension in 1941, the T-34M, was abandoned after the outbreak of the war because of the need to concentrate on mass production at the expense of technical improvements. Once the Soviet tank industry was re-established in the Urals and resumed full-scale production, improvement of the T-34 design was again considered. This resulted in the T-43 design of 1943, a modest reconfiguration which incorporated improvements to the suspension and turret layout. However, the T-43 had neglected to improve the armament of the T-34, and in the wake of the battle of Kursk, the Red Army demanded a better-armed tank. Although a small number of T-43 tanks were manufactured and saw some combat in the autumn of 1943, the focus of attention was an accelerated program to mount the more powerful 85mm gun on the existing T-34 hull. This entered service in early 1944 and proved to be an adequate solution to battlefield requirements. (This tank is covered in more detail in Osprey's New Vanguard 20, *T-34-85 Medium Tank 1944–94*). Once again, the KB-520 design bureau, headed by Aleksandr Morozov at the Uralvagon Zavod tank plant No. 173 (UVZ) in Nizhni Tagil, began to consider a future replacement for the T-34 codenamed *Obiekt 136.*

The design focus of the *Obiekt 136* was a new hull to permit the use of heavier armor able to withstand contemporary tank guns such as the German 75mm on the Panther tank. The designers wanted to incorporate thicker armor without substantially increasing the weight of the tank. The only way to do so was to reduce the hull volume. While the substitution of a torsion bar suspension for the Christie spring suspension partially

The T-44 shared many similarities with the T-34-85, including a closely related turret, and identical road-wheels and track. The new hull configuration was its most significant advance. This is one of the prototypes, seen during trials at Kubinka in 1944.





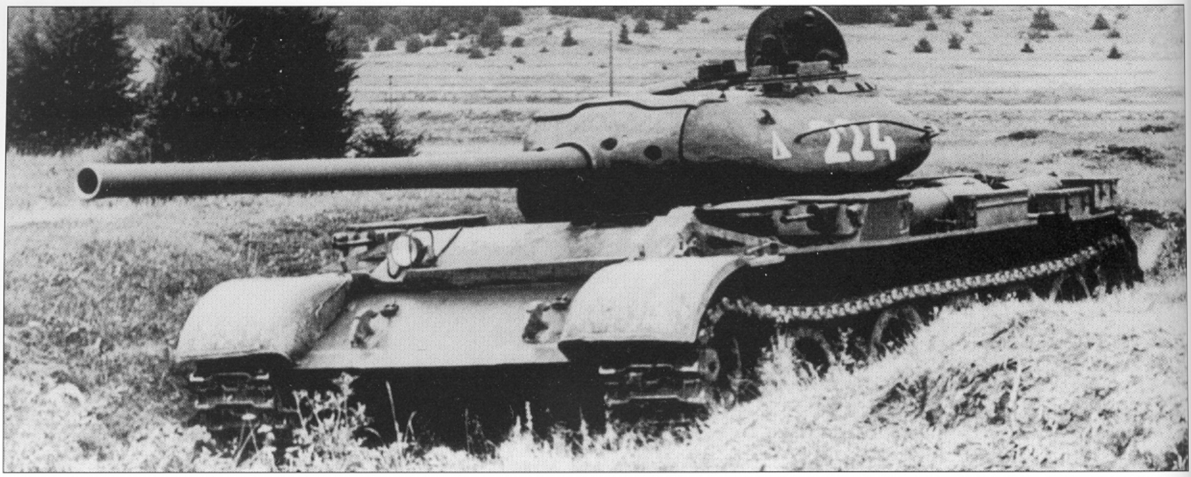
The aim of the T-44 program was to develop a tank superior to the most dangerous nemesis of Soviet tanks in World War Two, the German Panther tank. This scene from a comparative trial at Kubinka shows the T-44-122 prototype armed with the D-25T 122mm gun sitting alongside a Panther Ausf. D captured during the Kursk battles in the summer of 1943.

accomplished this, another important change was the decision to drop the redundant crewman in the right front hull station who operated the hull machine gun. This function was not particularly vital, and the volume could be better used to stow ammunition. As a result, the new hull was substantially lower than the T-34 hull, allowing the use of a thicker 120mm glacis plate. The turret was very similar to that used on the T-34-85 except that it did not need the same high collar around the turret race as the T-34 turret with its raised engine deck. In its original version, it was armed with the same 85mm guns as the T-34-85. Although both the D-5T and ZiS-S-53 85mm guns were tested on the *Obiekt 136*, the ZiS-S-53 was finally chosen. The design was accepted for Red Army service in 1944 and designated as the T-44. This tank represented the culmination of Soviet wartime design, with an impressive mixture of design simplicity and high combat effectiveness for a 30-ton tank. It is interesting to note that the Soviets were able to come very close to the combat capabilities of the German Panther in a design that weighed only about 65 percent as much.

Production of the T-44 began in 1944 in the re-established Kharkov tank plant and about 20 were completed by year's end. Through 1945, a total of 965 tanks were finished and a total of 1,823 were manufactured in Kharkov before production ended in 1947.

THE EARLY T-54 TANK

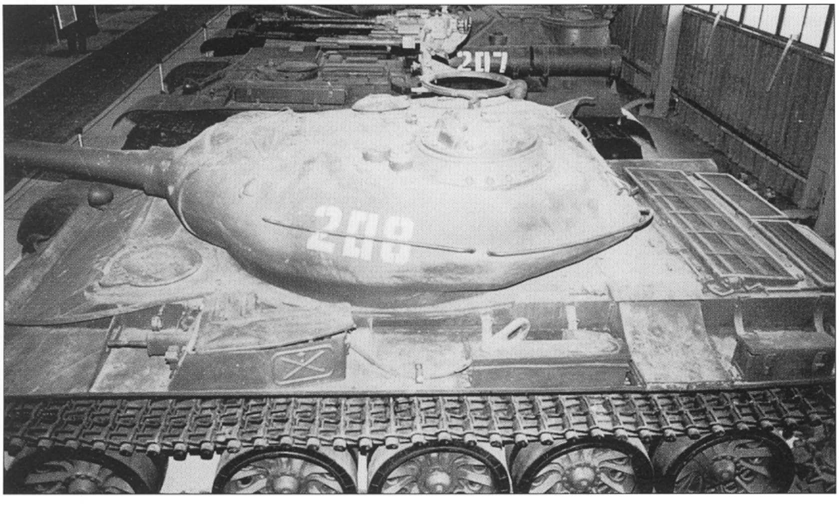
Although the 85mm gun was adequate on the contemporary battlefield, Soviet designers had learned to avoid complacency and immediately began to consider more potent weapons. During 1944, development began of T-44 prototypes with 100mm and 122mm guns. Both the D-10T and LB-1 100mm guns and the D-25T 122mm gun were mounted in different turret configurations. These weapons offered superior firepower to the 85mm gun, but the 122mm gun was much too bulky for the T-44 turret and its two-piece ammunition was too large and cumbersome. The 100mm D-10T gun was favored, but even after the narrow turret was enlarged to accommodate the longer ammunition, the T-44 turret was still too cramped to effectively service the weapon. A new design was prepared from 1945, originally called *Obiekt 137*, and later T-54. The principal emphasis in this program was a larger turret to better accommodate the



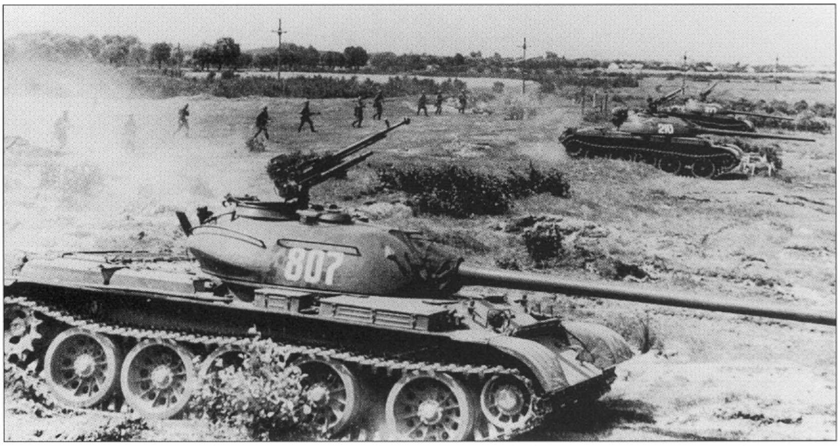
From the front, the T-54-1 bears some resemblance to the T-44 due to the use of a similar wide mantlet. This photo, taken in the 1950s during summer exercises, shows the other distinctive details of the type, such as the fender machine gun boxes, the single forward headlight, the cylindrical external fuel cells, and the narrow 500mm track.

100mm gun, with armor thickened at the front to 200mm. The principal internal changes of the T-54 included the new V-54 engine, and a two-stage reduction box which made steering considerably easier. The first prototype was completed at Nizhni Tagil by the end of 1945. It was accepted for service in April 1946 and entered production in 1947 in Nizhni Tagil and in Kharkov the following year. It was later called the T-54-1 or T-54 Model 1946 to distinguish it from subsequent variants. The postwar five-year plan for 1946–50 called for the production of 22,800 medium tanks and assault guns, including 1,150 in 1947 and ramping up to 4,350 in 1948 as the T-54 was ready. But the early T-54 failed to live up to expectations and its production during these years was curtailed, with the T-34-85 accounting for about 88 percent of production through 1950.

The most significant tactical drawback of the new gun was that the ammunition was so large that it reduced the number of rounds carried to only 34 compared to 60 in a T-34-85. The T-54-1 was first issued to units in the Byelorussian Military Districts for trials. So many problems were uncovered that series production was halted. In the mid-1960s, most of the surviving examples of this failed version were demobilized and the turrets used as armored pillboxes in a new defensive belt along the



This overhead shot shows the unusual shape of the T-54-1 turret. The undercuts at front and rear as well as the wide mantlet made the turret unnecessarily vulnerable to gun fire, and it was quickly replaced by a more satisfactory design. This view also shows the distinctive machine gun boxes on the front of the fenders containing an SG-43 machine gun. This tank is preserved at the NIIBT museum at Kubinka outside Moscow. (S. Zaloga)



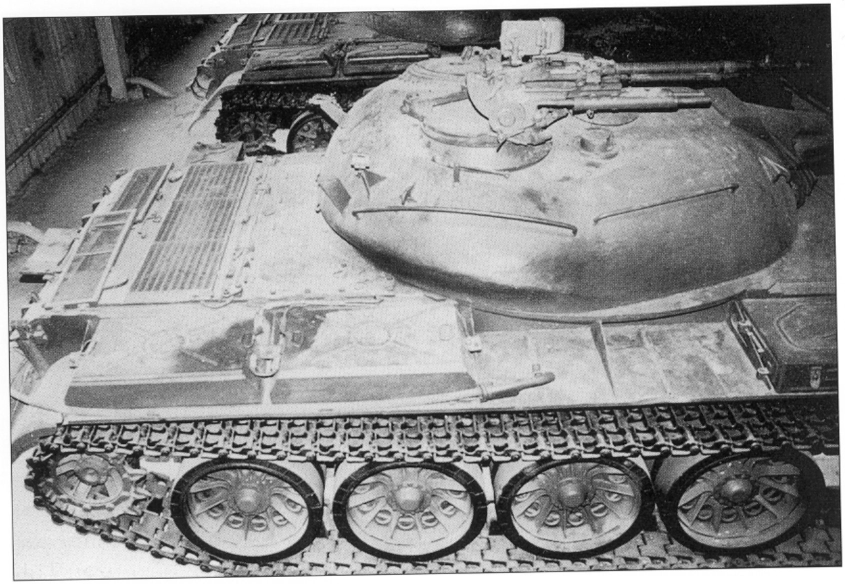
The T-54-2 tank introduced an improved turret with a narrow pig-snout mantlet. It can be distinguished from later versions of the series by its distinctive rear overhang. This tank shows the standard early production features such as the welded rear fuel cells, the spider wheels, and the single front headlight.

Chinese border. While there are no available details of T-54-1 production, production of the D-10T tank gun in 1947–48 was 1,200, which is probably close to the number of tanks manufactured.

The new T-54-1 turret design was not entirely successful. The Soviet Army was very impressed with the simple turret design of the new IS-3 heavy tank which was a hemispherical shape without shot-traps along the front. In contrast, the T-54 turret had a wide and vulnerable gun mantlet and pronounced shot-traps on either side of the turret front. This led to a second turret design that was accepted for series production in 1949 as the T-54-2 or T-54 Model 1949. The design was judged so popular that the Politburo authorized the conversion of a third tank plant to T-54 production, No. 13 in Omskr besides Plant No. 183 in Nizhni Tagil and No. 75 in Kharkov which had already been manufacturing the earlier models. Production of the D-10T gun in 1949–50 was only 750 guns, but this rapidly increased with the success of the T-54-2 design, so that in 1951 it was 1,795 guns, and 1,925 in 1952. The new T-54-2 turret was the first step in the direction of the classic T-54/-55 turret. It adopted a new, narrow, "pig-snout" mantlet and a much simpler round frontal shape. The SG-43 machine gun bins on the fenders were replaced by a single internally mounted machine gun which fired through a small hole in the glacis plate. Shortly after production began, a new wider 580mm track was adopted which became standard on the design for nearly 30 years. Internally, this version introduced a multi-stage centrifugal oil-bath air filter. The T-54-2 remained in production through 1951. The final refinement of the T-54 series took place in 1950–51 with a third turret design. At this time, the turret overhang on the T-54-2 turret was deleted, resulting in a bisected egg-shaped turret with the narrow portion pointed forward. This variant also introduced many small improvements, such as the new TSh-2-22 telescopic sight. The T-54-3, also known as the T-54 Model 1951, was in production from 1952 to 1954. Under the 1951–55 five-year plan, 11,700 T-54s were authorized for production.

THE T-54A TANK

By the early 1950s, the main Soviet medium tank design bureau, A. A. Morozov's KB-520, had been relocated from its wartime refuge in the

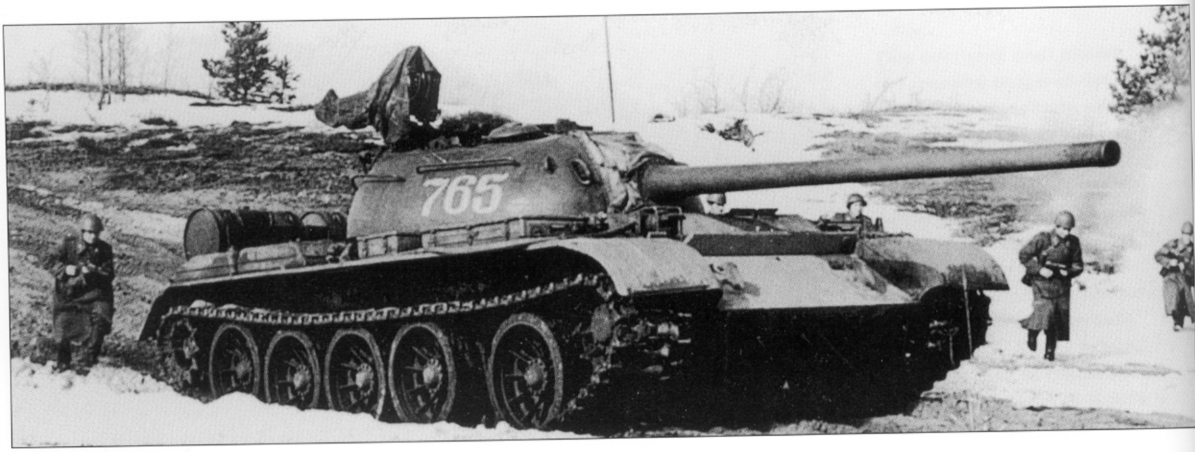


This overhead shot shows several of the distinctive features of the T-54-2 tanks, notably the overhang at the rear of the turret. It is also noteworthy since it is still fitted with the original welded external fuel cells. By the mid-1950s, these gave way to the more typical stamped fuel cells. (S. Zaloga)

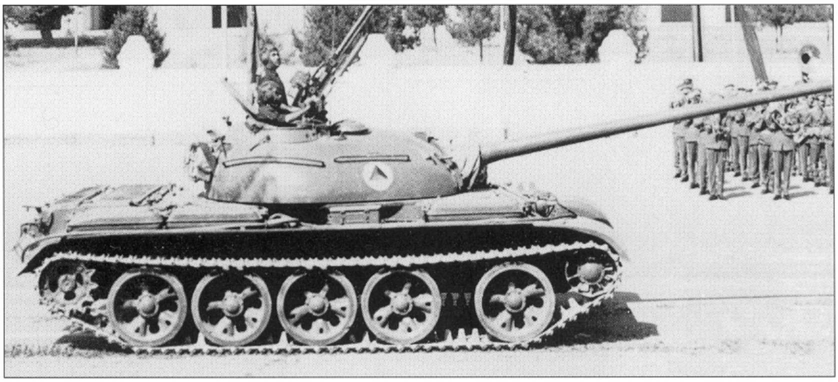
Urals at the Nizhni Tagil UVZ tank plant No. 183, back to its original home in the Ukraine near the Kharkov No. 75 tank plant. Morozov's ambition was to design a revolutionary new tank that would advance tank technology as much as the T-34 had done in 1940. The Soviet Army finally acceded to his requests, leading to the development of *Obiekt 430* which would eventually become the T-64 tank. Morozov tried to shed responsibility for the further evolution of the T-54 series, and this was gradually taken over by a new "Vagonka" team under L. N. Kartsev at the Nizhni Tagil UVZ tank plant, starting with the T-54A tank.

The US Army had pioneered the use of gun stabilization systems to permit tanks to fire while on the move, and the Soviet Army began to study this concept more closely in the late 1940s by examining the M4 Sherman tanks provided during the war as part of the Lend-Lease program. Studies suggested that the probability of hits while moving could be increased from 3 percent to 30 percent with a stabilizer. The first of these systems to reach production was the STP-1 *Gorizont* ("Horizon") system developed by I. V. Pogozhev's TsNII-173 in 1951 which stabilized the gun in the vertical plane. Adaptation of the *Gorizont* to the T-54 was studied

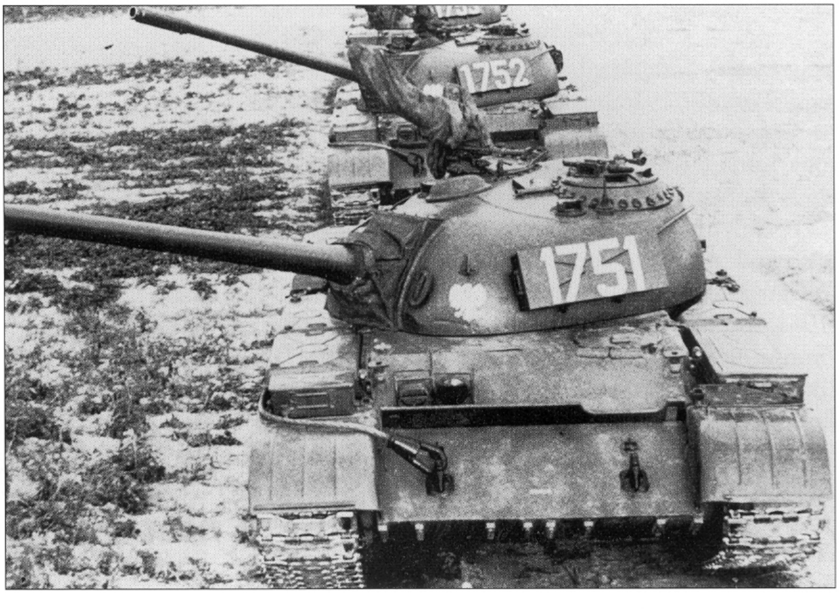
The T-54-3 was the definitive version of the early T-54 series, debuting the standard turret shape. This is a relatively rare view of a production tank prior to rebuilding with the original spider wheels and the single front headlight.



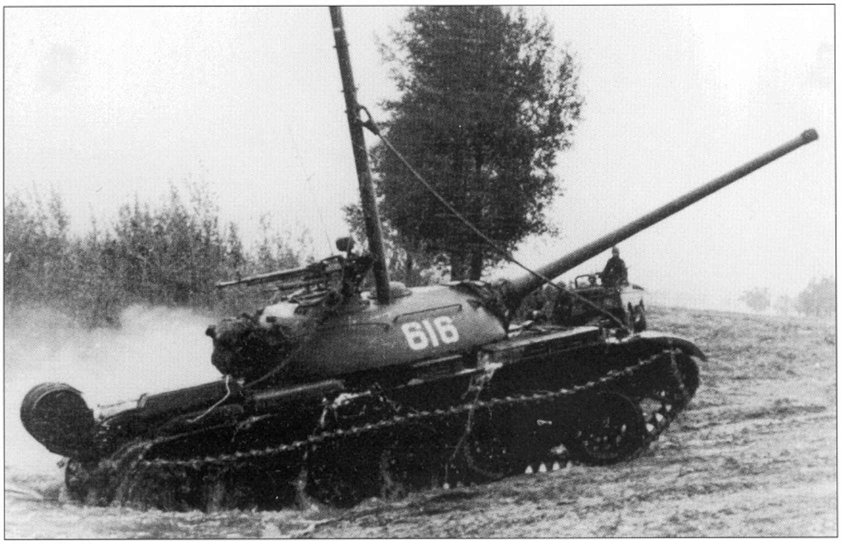
The T-54-3 tank used a simple hemispherical turret with a distinctive egg shape, narrower at the front. This Afghan T-54M is seen parading in Kabul in the late 1970s and has been rebuilt with the later starfish wheels, double front headlights, and other upgrades. (US DoD)



on the *Obiekt 137G*. During the Korean War of 1950–53, the Chinese captured a number of US M26 and M46 tanks, and passed on examples to the Soviet Army for technical evaluation. One of the technical innovations that came from these trials was the use of a bore evacuator on the main gun which helped to reduce the accumulation of gun fumes in the turret. This was adapted to the D-10TG gun. In light of the many improvements being studied on the *Obiekt 137G*, a general modernization effort was incorporated into the design. This included the introduction of OPVT snorkel equipment on the tank which, when attached to the tank along with waterproofing, permitted deep fording of rivers up to 5 meters deep. Other improvements included the upgraded TSh-2A-22 telescopic sight, the new TVN-1 infrared (IR) driver's periscope and related IR driving headlight, the new R-113 radio, a new multi-stage air cleaner, and radiator controls for improved engine performance. The *Obiekt 137G* was accepted for service in 1955 as the T-54A and series production was approved in the USSR in the autumn of 1954, with plans to finish the first 50 by year's end. However, none were completed until 1955 when D-10TG gun production began at artillery plants in Sverdlovsk and Perm. A total of 2,102 D-10TG guns were completed in 1955, 1,854 in 1956 and 840 in 1957. The Warsaw



The T-54A tank went into production in Poland and Czechoslovakia as well as the Soviet Union. The Polish-manufactured T-54A introduced several locally developed improvements, including additional "L"-shaped fuel cells seen here on either side of the turret ring, and an additional ZIP stowage bin on the turret. (Janusz Magnuski)

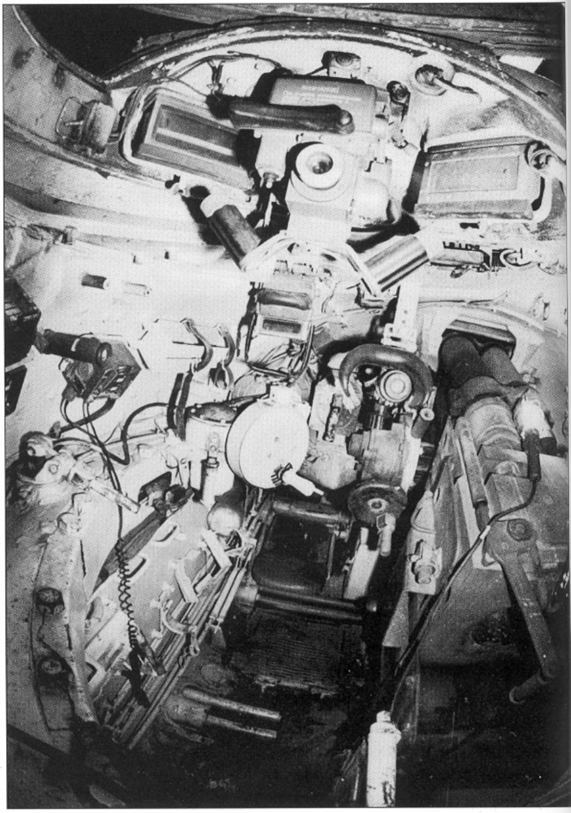


The OPVT snorkel system for deep fording of rivers was added on the T-54A tank. Besides the snorkel itself, the tank had to be extensively waterproofed before the operation.

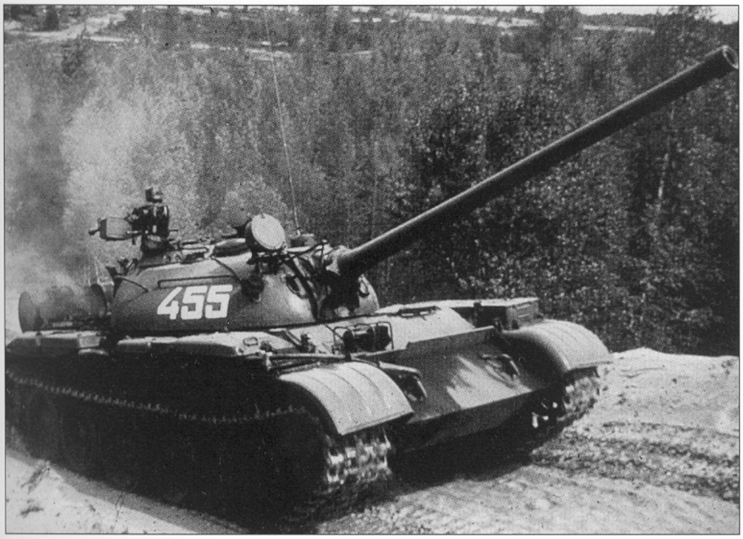
Pact countries had been manufacturing the obsolete T-34-85 for several years, and the Khrushchev administration decided that it would be prudent to produce a more modern design, so the Bumar-Labedy plant in Poland manufactured about 2,855 T-54A tanks from 1956 to 1964. The ZTS Martin plant in Czechoslovakia built 2,490 T-54A and 120 T-54AK command tanks from 1958 to 1966. China also began manufacturing this type under license as the Type 59 (see page 37–9 for more details).

While the T-54A was in production, development work on gun stabilization systems continued at TsNII-173 with an aim to increase the hit probability from 30 percent to 60 percent. This resulted in the two-axis STP-2 *Tsyklon* ("Cyclone") system that was incorporated into three *Obiekt-137G2* prototypes completed in June 1955. Following tests, this tank was accepted for service use in 1956 as the T-54B, which replaced the T-54A at Soviet plants in early 1957. The first ten D-10T2S guns were completed at Sverdlovsk in 1956, and 1,190 in 1957. Improvements were incorporated throughout the production run: in April 1959 the new Luna L-2 infrared searchlight was added, along with the associated TPN-1-22-11 infrared night sight to permit night fighting. An OU-3 IR searchlight was also added on the commander's cupola. Although infrared night driving features had been added in 1954, this was the first time that the tank was fitted with a full night-fighting suite of features. The Polish-built version of the T-54B was designated locally T-54AM, and this version was sold to other Warsaw Pact countries including East Germany. There were some production differences between the Polish and Soviet T-54A and T-54B tanks, such as the addition of two locally designed "L"-shaped fuel cells on the left fender, the reconfiguration of the

A view inside the T-54A from the commander's station looking forward towards the gunner's station. The driver's seat has been removed, so it's possible to see the driver's seat, which in this case has its backrest folded back. The large breech of the D-10T gun is evident to the right and the gunner's telescopic sight is towards the center of the photo along with the various traverse and elevation controls. (S. Zaloga)



right rear air intake, and a different configuration of tool box stowage. Internal changes included a rotating turret floor, hydraulic assist for the driver controls, and many small upgrades. The Czech tanks shared some, but not all of the Polish modifications.



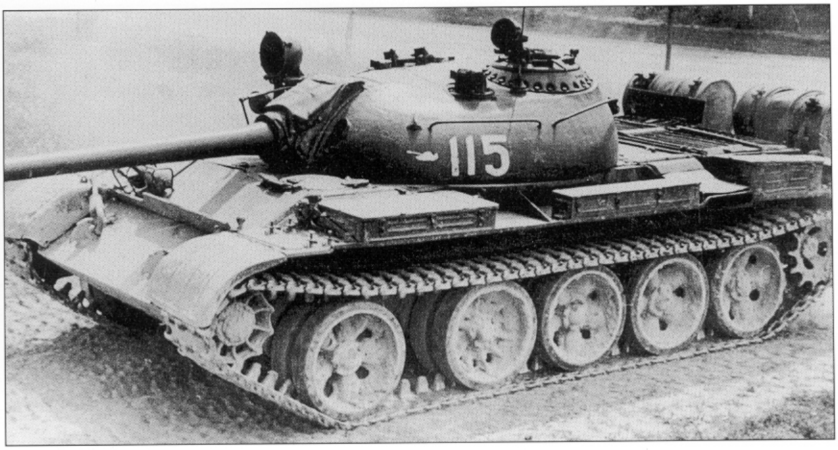
The T-54B introduced the Luna night-fighting system to the T-54 series, most evident by provisions for the L-2 infrared searchlight next to the main gun. In fact, this is a T-54M modernized to T-54B standards, evident from the D-10T gun tube with muzzle counterweight instead of the D-10T2S with bore evacuator that was fitted to the standard production T-54B.

Besides the basic tank versions of the T-54, command tank derivatives were usually built in parallel as T-54K, T-54AK, and T-54BK. The basic T-54AK-1 was for company commanders and had a second R-113 radio. The T-54AK-2 was for battalion commanders, regimental commanders, and regimental chiefs-of-staff. This version was also fitted with the HTM-10 telescoping antenna mast for extended broadcast range. The Polish-built T-54AD (*dowodca*: “command”) had a modified turret with a slight extension on the turret rear to provide space for the command radios.

The last major developmental version of the T-54 series was the *Obiekt 139*, also called the T-54M. This served as the test-bed for the new D-54T 100mm smoothbore gun that had entered development in 1952. The prototype was completed at Nizhni Tagil in October 1954 and included a number of other improvements such as the Raduga stabilization system, an increased ammo load of 50 rounds, a 14.5mm anti-aircraft machine gun, a new wheel design, and the uprated V-54-6 engine. The trials uncovered problems with the Raduga stabilization system, leading to a September 1955 reconfiguration of the design as the *Obiekt 140* with the new Molniya stabilization system and the associated D-54TS gun. Lingering problems with the gun led to the decision to stay with the D-10 series on the new T-55 tank, but D-54T development continued on the new *Obiekt 165*, which evolved several years later into the T-62 tank. Total production of the T-54 series was about 24,750 in the Soviet Union, 5,465 in the Warsaw Pact countries, and more than 9,000 Type 59 tanks in China, a total of about 40,000 tanks not counting associated specialized armored vehicles on the T-54 chassis.

NUCLEAR BATTLEFIELD: THE T-55 TANK

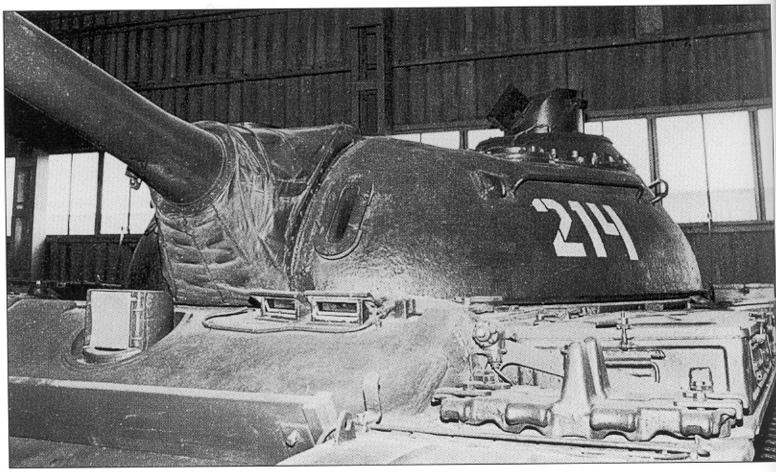
In the mid-1950s the Soviet Union began experiments to examine the survivability of tanks near the detonation of a tactical nuclear warhead. These tests revealed that the crew would be killed by the blast overpressure even inside the tank. As a result, studies began to examine methods to seal off the interior of the tank from the blast effects. These efforts coincided with an October 1955 Vagonka proposal for a “deep” modernization of the T-54B design to better integrate the numerous small improvements that had been gradually incorporated into the



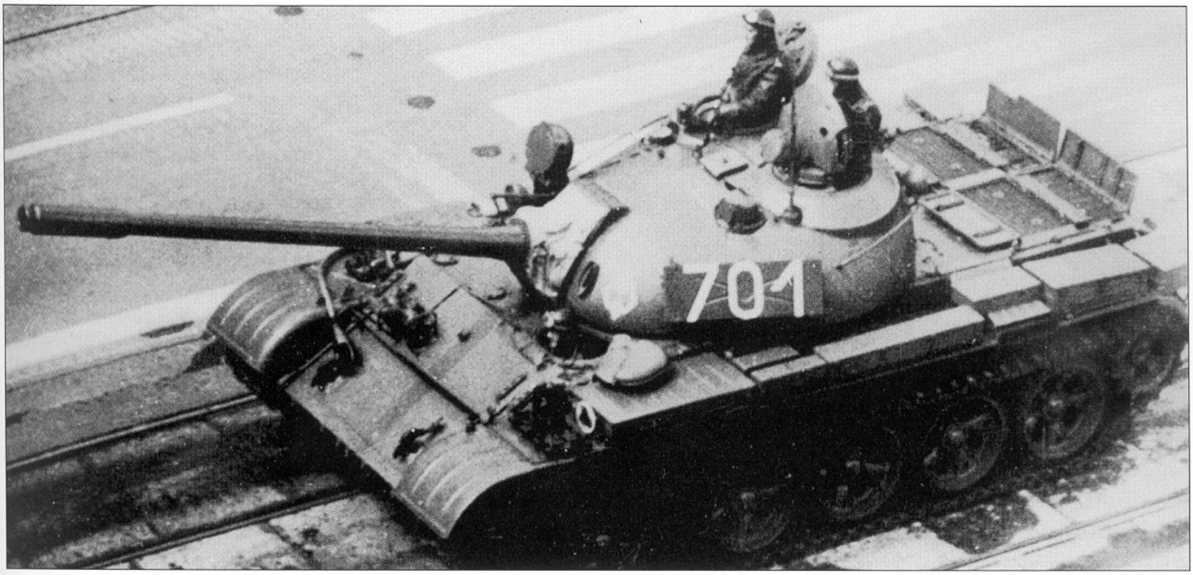
One of the few ways to easily distinguish a T-55 from a T-54B is the absence of the 12.7mm machine gun over the loader and the deletion of the mushroom dome vent on the right roof of the turret. This early production T-55 tank is seen on summer exercise in the early 1960s.

design over the past decade. The new *Obiekt 155* included a first-generation protective suite (PAZ) which sealed the hull, protecting the crew from the shock wave of a nuclear blast and included atmospheric overpressure to keep out radioactive dust or chemical warfare agents. The powertrain was improved by incorporating the new V-55 engine and the new 155.08sbB transmission which increased the maximum speed to 50km/h. Fuel capacity was raised to 960 liters by adding two external 200-liter drums, and the main ammunition stowage was increased to 43 rounds by redesigning the front ammunition bin so that the rounds actually sat within the front fuel cell. The PAZ system required a number of changes to the hull and turret such as the deletion of the large mushroom vent on the turret and the resulting redesign of the turret roof. A new TDA smoke generation system was added which created a smoke cloud by spraying oil on hot engine surfaces rather than using conventional pyrotechnic smoke pots. The new "starfish" road-wheels replaced the "spider" wheels used earlier. The external DShK anti-aircraft machine gun was left off because of its dubious utility in combating modern jet strike aircraft, as well as the arrival of a new generation of air defense weapons in the Soviet tank divisions. The *Obiekt 155* was accepted for service in May 1958 as the T-55 tank, and series manufacture took place from June 1958 to July 1962.

The use of tactical nuclear weapons on the battlefield posed the risk of blinding tank crews. In 1961 the Almaz television system was mounted on a T-55 for trials to circumvent this problem, and the sights can be seen to the left of the driver's hatch and on the commander's cupola. This example is preserved at Kubinka. (S. Zaloga)



Although the PAZ protective suite on the T-55 protected the crew from the harshest effects of nuclear combat, it did little to protect them against the radiation from a nuclear blast. The Morozov team in Kharkov, in conjunction with NII Stali (Scientific Research Institute for Steel), had been developing a special protective lining called POV, and this research was made available to the Vagonka bureau in Nizhni Tagil leading to the *Obiekt 155A* program in 1961. The lead-impregnated plastic was

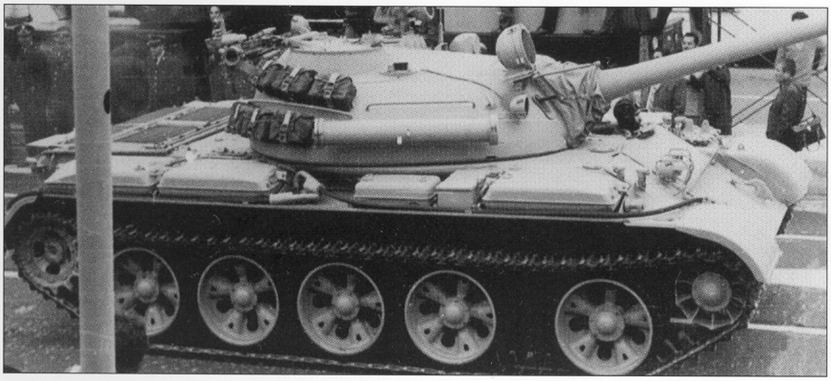


The T-55 tanks manufactured in Poland and Czechoslovakia had many small detail differences from the original Soviet design. The Poles fitted an extra ZIP tool stowage bin on the left side of the turret, and the fan door on the right rear corner of the hull has a distinctive notched shape instead of the rectangular shape of the original Soviet design. This Polish T-55A shows the distinctive features of this version such as the prominent combing around the turret hatches which contained a protective anti-radiation lining. (US Army)

used to line the interior of the crew areas on the *Obiekt 155A*. However, because of the cramped conditions inside the tank, it was necessary to mount some of the POV on the outside of hatches and hatch combings, protected by a thin steel cover. Besides the POV, the protective suite also was improved with an air filtration system to provide better protection against chemical agents than the overpressure system alone. These modifications were accepted for army use as the T-55A tank and production began in August 1963.

Further development of the T-55A for the Soviet Army was strongly affected by another tank which was based on the T-55, the *Obiekt 165* and the related *Obiekt 166*. These programs aimed at adapting the new D-54T smoothbore gun to the T-55 hull as mentioned earlier in the T-54 section above. The Vagonka design bureau decided that it would be a more effective design if the T-55 hull was lengthened to permit a turret with a wider turret race. Although the design proved practical, the program took an abrupt shift in January 1961 after a disgruntled Iranian officer drove his brand new M60A1 tank over the border into the Soviet Union. The US Army's M60A1 armor layout and its new 105mm gun infuriated the chief of the Soviet tank force who insisted that the caliber of the new Soviet smoothbore gun be increased from 100mm to 115mm to exceed the NATO 105mm gun in performance and to deal with the M60A1's thicker armor. Ironically, the British 105mm gun had been adopted by NATO in the late 1950s after British officials examined a T-54A tank driven onto the grounds of the British embassy in Budapest during the 1956 Hungarian uprising.

The lengthened T-55 with the 115mm gun in a new turret was accepted for service as the T-62 tank in July 1961. A total of 25 T-62 trials tanks were built in 1961 and full-scale series production began on 1 July 1962. The decision to shift to the T-62 tank led to a curtailment of T-55 production for the Soviet Army. The Kharkov and Nizhni Tagil tank plants turned over a portion of their production lines to manufacture the new T-62 tank and ceased T-55 production altogether in 1967 at Kharkov in favor of the T-64 and in 1971 at Nizhni Tagil in favor of the T-72. So only the Omsk plant



The final production T-55 tanks intended for export had all of the changes of the T-55A, but lacked the anti-radiation lining. Several features were distinctive including the stowage of the OPVT snorkel on the right turret side, the 12.7mm machine gun combing, the added 12.7mm ammunition stowage on the right turret rear, and the provisions for stowing the 12.7mm machine gun on the turret rear. This is a Peruvian T-55 on parade in Lima in the 1980s. (US DoD)

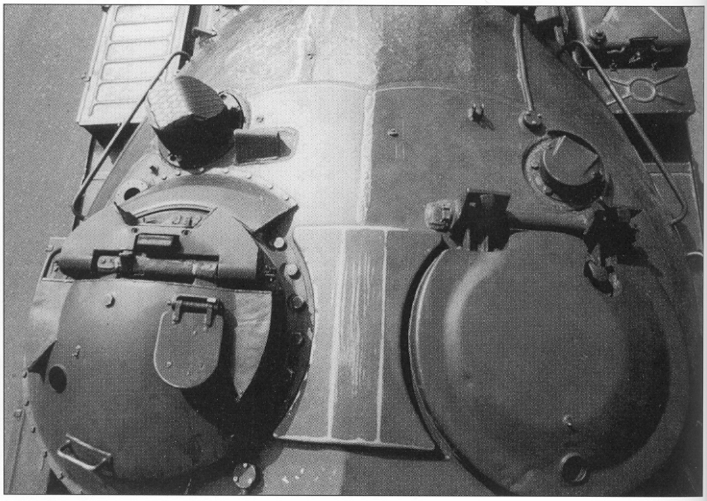
continued manufacturing the T-55A until 1977, outlasting the T-62 in production. In the later years, T-55 production was almost entirely for the burgeoning export market, especially in the Middle East.

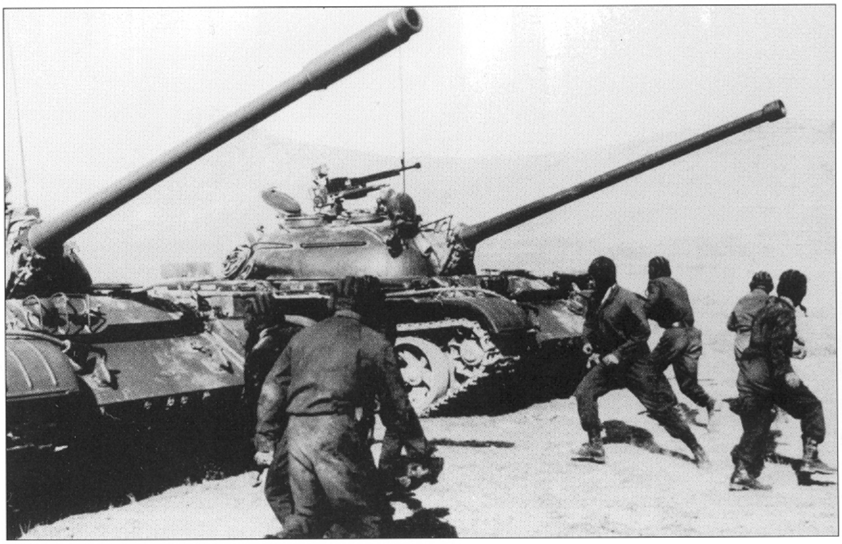
Although being manufactured in dwindling numbers, the T-55A continued to be modified and upgraded through the end of its production run. In 1970, the loader's hatch was modified to accommodate a DShK-M anti-aircraft machine gun. Although this had been dropped from the original T-55 tanks, the advent of NATO anti-tank helicopters such as the AH-1 Cobra prompted a return of this venerable weapon. In 1974, the KTD-1 (*kvantoviy tankoviy dalnomer*) laser rangefinder was mounted above the gun mantlet in an armored box to improve the accuracy of the gun at longer ranges. Previously, the T-55 gunner had to estimate the range to the target by using some simple stadia reference marks in the sight mechanism which was not very precise. Some of the T-55 tanks built specifically for export lacked the anti-radiation lining.

As in the case of the T-54, command tank variants of the basic T-55 were manufactured in small numbers and because of the additional radio equipment, carried five rounds less of ammunition. There were three principal types: the T-55K1 and K2 version both carried two R-123 or R-123M and an R-124 radio. The T-55K3 carried one R-130M, an R-123M, an R-124, and a 10-meter antenna. Variants based on later chassises were designated accordingly: T-55AK, T-55MK, and so on. Total production of the T-55 from 1959–77 in the Soviet Union was about 30,000 tanks.

The Bumar-Labedy plant in Gliwice, Poland began T-55 production in 1958, switching to the T-55A in 1964 until 1979, with about 7,000 built. The Polish command versions had their own local designation, T-55AD1 for the version with the extra R-130 radio and T-55AD2 for the version with the added R-123. The Polish tanks were widely exported to other Warsaw Pact countries such as East Germany and commercial clients such as Iraq. Likewise, T-55 production was undertaken at the ZTS Martin tank plant in Czechoslovakia in 1958–82 including

The T-55A introduced added anti-radiation linings inside the tank. To cover the hatches, the lining was added over the existing hatch designs with a sheet metal cover over it. This view of the roof of a T-55A tank shows the distinctive hatch covers of the T-55A. (S. Zaloga)





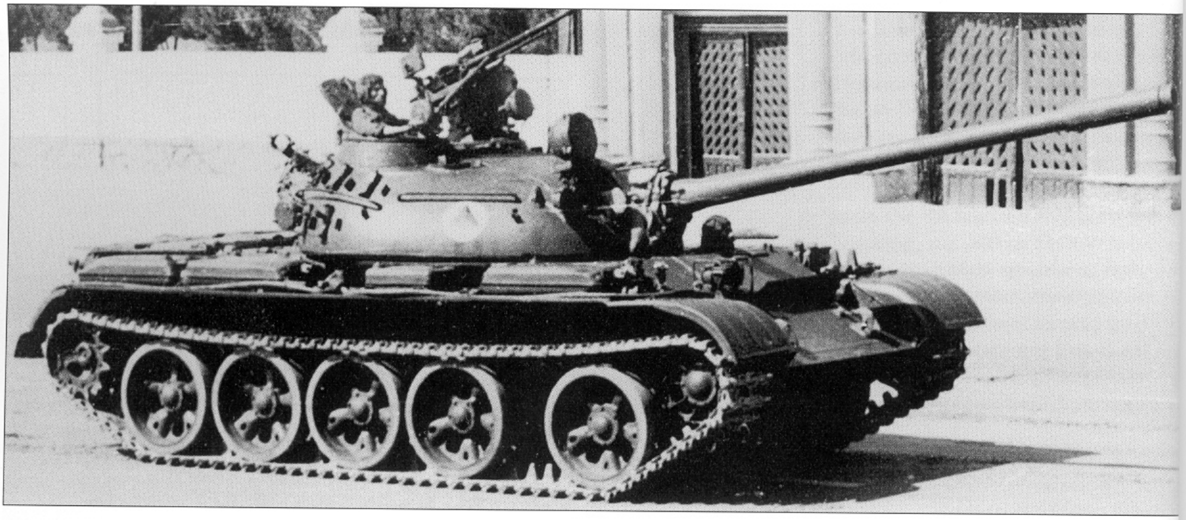
This view of an Afghan tank regiment in the late 1970s provides a good example of the difficulty of identifying T-54 and T-55 tanks after their frequent rebuilds. The tank to the right is clearly an early T-54-2 from the underhang at the rear of the turret. Yet it has the later starfish wheels, Luna nightfighting equipment, and stabilized gun, as is evident from the use of the muzzle counterweight. (Wojciech Luczak)

3,377 T-55, 3,820 T-55A, and 1,280 T-55AK1 tanks, with a significant fraction of these exported. Romania built a modified version of the T-55 called the TR-580 (export name TR-77), with about 400 built. This used a lengthened hull and a new suspension system with smaller wheels, and was followed by the TR-85, a drastically modified version of the T-55, with a new German diesel engine and a completely redesigned suspension. The turret, although resembling the T-55, was in fact completely new.

REBUILT TANKS

Soviet tanks were not particularly durable by NATO standards, since the Soviet design philosophy favored the manufacture of larger numbers of inexpensive tanks on the assumption that their life expectancy in modern warfare would be short. In the T-55 series, the tank generally underwent medium rebuilding after 2,000km of use and capital rebuilding after 7,000km. A network of rebuild plants (*remontniy zavod* or *remzavod*) was established to specialize in these upgrade efforts. The most significant of the T-54 repair plants were Remzavod-7 in Kiev, Remzavod-17 in Lvovr and the Kharkov Remzavod. Typically, Soviet tank regiments would limit the use of most of their tanks to keep them war-ready, and only a small portion of the regiment's tanks would be used regularly for training so that capital rebuilding was only necessary about once every ten years. Capital rebuilding often included an effort to upgrade the tank to a higher production standard with new features that had been developed in the intervening years. These rebuilding programs changed many details on tanks, and makes it very difficult to identify the specific type of tank. For example, a T-54-3 rebuilt with a Luna searchlight system and new TPN-1 gunner's sight is hard to distinguish from a T-54B. Tanks often underwent several capital rebuildings adding layer on layer of changes, and making it even harder to categorize its precise model.

The first major rebuild effort was the T-44M program. This 1961 effort was organized by UVZ to upgrade the older T-44 tanks using components from the newer T-54 series. This included a separate effort starting in

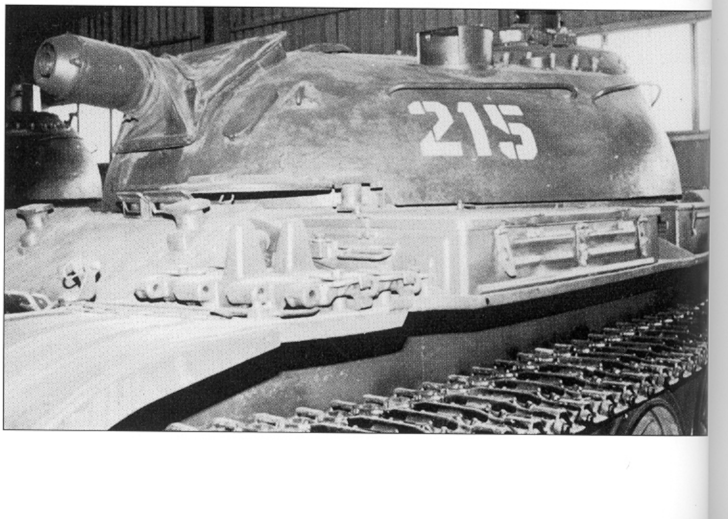


Rebuilt T-55M tanks had several distinctive details such as the added stowage clips for 12.7mm ammunition on the right rear side of the turret, and the added 12.7mm machine gun. This is an Afghan T-55M on parade in Kabul in the late 1970s. (US DoD)

1963 to upgrade some of the tanks as T-44MK command tanks with R-112 and R-113 radios.

The T-54M program began in the mid-1960s to upgrade the T-54 with new features and components from the T-55 program. To further confuse matters, a second T-54M program was developed in 1977 by the Omsk KBTM, with further upgrades, including the addition of the OPVT system and the KTD-1 laser rangefinder. Command tanks with these upgrades were designated as T-54MK. The T-54AM upgrade in the mid-1960s brought the T-54A closer to T-55 standards, including the increase in stored ammunition by another nine rounds through the use of the modified forward fuel cells, new radios, and the V-55 engine. Some of these later models received the RMSh tracks in the late 1970s and early 1980s. The RMSh was a new live track originally developed for the T-72 tank, but was suitable for refit for the T-54/T-55 series if a new drive sprocket was fitted. These modification programs were also undertaken in the Warsaw Pact countries, though often other designations were used. For example, the rebuilt T-54 tanks in East Germany were designated as T-54Z, T-54AZ, and T-54AMZ, the Z signifying *Zusatzausrustung* ("added equipment"). In Czechoslovakia, the modernized T-54A with a local deep wading system was called the T-54AR *Rieka.*

Beginning in 1972, T-55 tanks undergoing rebuilding began to receive a new cupola ring for the 12.7mm DShKM anti-aircraft machine gun. Two different machine gun fittings were used. On vehicles with the larger anti-radiation hatch collars, a collared mounting was used. In the late 1970s, a low-cost export type was produced, with a simpler collar and a hatch arrangement derived from the T-62M. Beginning in 1974, T-55s were retrofitted with the laser rangefinders. Comparable programs were undertaken among



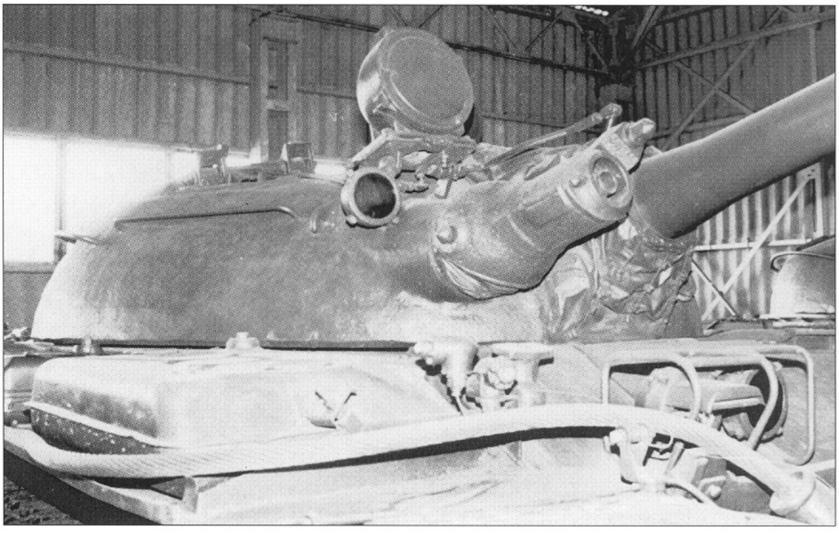
The *Obiekt 483* was an experimental flamethrower tank, which mated the OM-250 flame-gun with the T-54B. It was not accepted for service as the army preferred flamethrower tanks that preserved the main gun. This example is seen at the Kubinka Museum. (S. Zaloga)

the Warsaw Pact armies, although there were local variations, such as the use of the Kladivo laser rangefinder on Czech rebuilds.

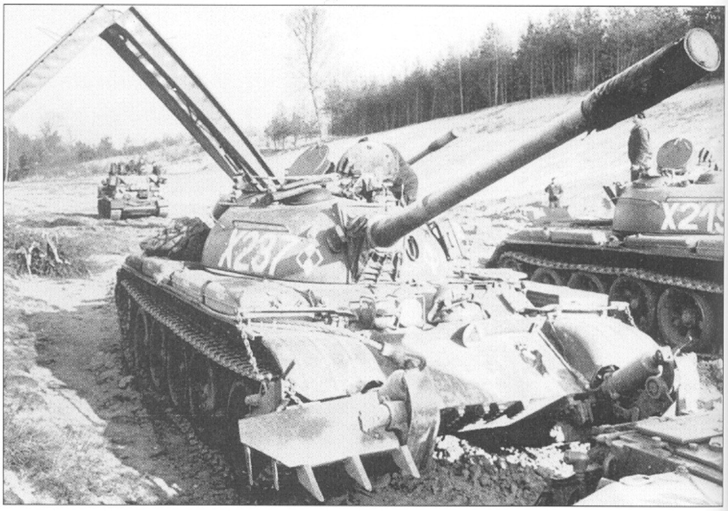
Besides the modification efforts, there were separate programs to improve the capability of the T-55 by developing better ammunition. Throughout the 1960s the basic anti-tank round of the D-10T gun was the UBR-412, which was manufactured with several sub-types of BR-412 projectiles, including the basic BR-412 AP-T and the ballistic-capped BR-412B and BR-412D. In the summer of 1964, the NII-24 began work on the first 100mm hyper-velocity armor-piercing, discarding sabot (HVAPDS) round for the D-10T tank gun, the 3UBM6 with 3BM6 projectile. This projectile had substantially better anti-armor penetrating power than the BR-412, about 290mm at 2km against a vertical target, and about 80mm through armor angled at 60 degrees. This ammunition was officially adopted in 1967. It was supplanted by the 3BM8 projectile which used a tungsten carbide core. In the 1980s the 3UBM11 round with 3BM25 fin-stabilized, discarding sabot (APFSDS) projectile was issued which used a tungsten carbide arrow for higher speed, greater range, and better armor penetration. There were similar advances in HEAT (high explosive anti-tank) ammunition. The first type adopted in the 1960s was the 3UBK4 with 3BK5M projectile, and this was supplanted later by the 3UBK9 with the improved 3BK17M projectile. The typical ammunition load in the T-55 in the 1960s and 1970s was 28 high explosive rounds, nine AP rounds, and six HEAT rounds. During the 1980s, the mix shifted somewhat, with more emphasis on anti-armor ammunition so it was typically 17 high explosive, 15 APFSDS, and six HEAT rounds.

COMBAT ENGINEER TANKS

The Soviet army has traditionally deployed small numbers of tanks with flamethrowers for attacking bunkers and other targets. In the early 1950s, KB-520 in Kharkov developed the *Obiekt 481* flamethrower tank which mounted a ATO-1 flame-gun on the right side of the main gun of a T-54 tank. This was accepted for service in 1954 as the OT-54, but was



The most widely used of the Soviet flamethrower tanks was the TO-55 (*Obiekt 482*) based on the T-55. It included an ATO-200 flame-gun mounted alongside the normal 100mm main gun. They were manufactured in 1957–62 on both the T-55 and T-55A, and retired from service in 1993. (S. Zaloga)

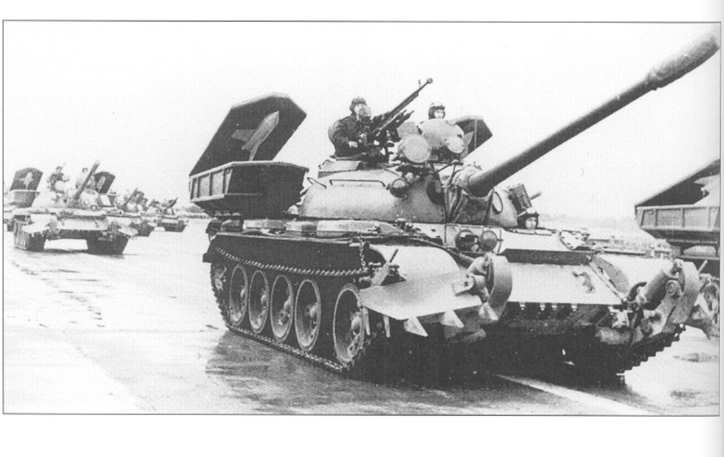


The KMT-4 mine rake was used to rapidly breach a minefield by scooping up mines and pushing them to one side. This Polish T-54A is fitted with the KMT-4 and behind it are some other engineer support vehicles including a BLG-60 bridge-layer and a WPT-34 armored recovery vehicle. (Janusz Magnuski)

built in very small numbers. This was followed in 1959 by the *Obiekt 483* based on the T-54B which dispensed with the main gun altogether, fitting a stubby flame-gun in its place. In parallel, the Omsk KBTM developed the *Obiekt 482*, which was similar to the *Obiekt 481/OT-54* but placed the improved ATO-200 flame-gun on the new T-55 tank. This was deemed more effective than the *Obiekt 483*, and was accepted for service in 1960 as the TO-55. This became the most common of the Soviet flamethrower tanks. The ATO-200 flame-gun is ignited by pyrotechnic cartridges, and 12 cartridges are the basic load. The stowage tank contains 460 liters of flammable liquid, and each burst averages 36 liters. The maximum effective range of the system is 200m.

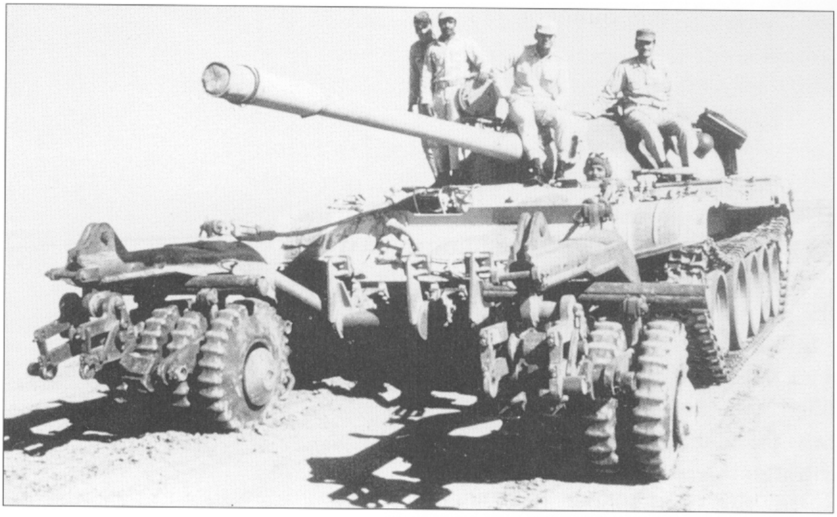
The Soviet Army developed an extensive array of specialized mine-clearing equipment for rapidly breaching minefields under hostile fire. The first of these used on the T-54 in the late 1940s was the PT-3 mine-roller (*protivominniy tral*, or "anti-mine trawl"), an evolutionary development of wartime designs. This type was short-lived, and was replaced by the improved PT-54 mine-roller system in the early 1950s. The PT-54 system used cheaper-cast rollers than the fabricated steel rollers of the PT-3. The system weighed 8.8 tonnes, and cleared two 1.3m lanes, with a 1.2m gap in the center. The main difficulty with such systems is that they are very heavy, and quickly ruin the transmission and powerplant of a tank. Throughout the 1950s, the main aim was to reduce the weight of the rollers, while retaining a reasonable likelihood of detonating (and surviving) anti-tank mines. The improved PT-54M appeared in the mid-1950s, which had five rollers per side, compared to six on the PT-54. This reduced the weight of the unit down to 7 tonnes, but narrowed the lane cleared to a path 0.89m wide per side. In the late 1950s, the PT-55 was introduced. This was another elaboration of the basic PT-54 design, but with only four rollers per side, and a drop in weight to 6.7 tonnes. This system could clear two lanes, each 0.83m wide, with a center gap of 1.7m.

Trawls like the PT-55 greatly reduce the mobility of the tanks to which they are attached. It takes 10–15 minutes to attach the two trawl assemblies using a crane and this activity must take place well behind the battle-line away from hostile fire. Another shortcoming of mine-rollers was their inability to detonate newer NATO mines with more sophisticated fuzing. The Soviet Army needed a more mobile and less cumbersome system for fast breaching, which led to the development of the KMT-4 mine



The Polish Army used its own distinctive combat engineer T-55A, fitted at the front with a KMT-4 mine rake, and on the rear with the distinctive bath-tubs containing the PW-LWD rapid explosive breaching system. (Janusz Magnuski)

The initial mine trawl assembly for the T-55 was the PT-55 system, seen here in the Sinai on an Egyptian T-55 in 1973 after the UN-sponsored ceasefire ended the 1973 war. It lacked the mine rakes found on the later and more common KMT-5 system. (UN)

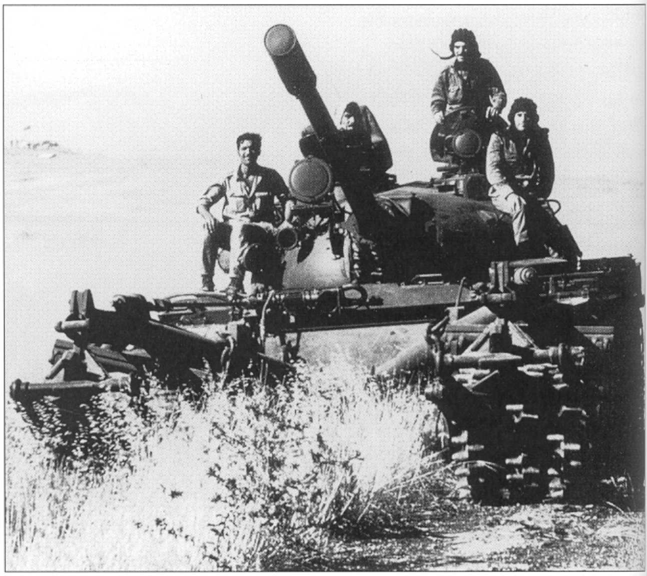


plow, commonly called a "mine knife" or "mine blade" by the Russians. The KMT-4 was a simple device, consisting of two small plow blades with five small tines to help dig into the earth. The plow blade was angled outward, so that while moving forward, it dug out the mines, and pushed them aside without detonating them. A T-55 tank fitted with a KMT-4 mine-clearing blade can travel at normal speeds until the blade is lowered. During minesweeping operations, its speed is reduced to 12km/h. Each tank company has an allotment of three sets of KMT-4, although often these are held by the tank regiment's engineer company. In the late 1960s, the improved KMT-4M was introduced, which had a modified hydraulic lowering system for the blade. A number of the tanks in each tank company have special mounting lugs attached to the upper and lower glacis plate to permit attachment of these devices. The KMT-4 was later succeeded by improved types including the KMT-6 and KMT-8.

The development of the KMT-4 was paralleled by the design of a refined mine-roller system, the KMT-5. (KMT: *kolesniy minniy tral*, or "wheeled mine trawl"). The KMT-5 system consisted of a KMT-4 mine blade, and a new roller system similar in appearance to the old PT-55, but with three thicker rollers than the PT-55's four. Besides the blade and rollers, a weight was hung between the forward roller assemblies with a chain to detonate tilt-fuzed mines that remained intact between the rollers and blades. The entire KMT-5 system weighed 7.5 tonnes, which was not significantly more than the roller assembly alone on the PT-55. The KMT-5 was fitted with an internal quick-disconnect system which allowed the driver to drop either the blades or rollers if necessary from within the vehicle. The KMT-5 became the standard Soviet mine-rolling system from the mid-1960s, supplementing the more common KMT-4. Besides the three sets of KMT-4 per tank company, each company had one set of KMT-5 components. The KMT-5 was fitted to both T-54 and T-55 tanks. In the late 1960s, the improved KMT-5M was introduced, which was an improved version of the KMT-5, but had added lane-marking equipment. The lane-marking equipment is attached to the rear of the tank, and drops luminescent PSK marking material onto the cleared lanes to assist tanks following behind to find the cleared path. The KMT-5 takes 30–45 minutes to attach to a tank, and can be operated at 12–18km/h depending on soil conditions. Improved combinations were subsequently developed for later tank types which could be fitted to the T-55 series.

The Czechoslovak army developed its own version of the KMT-5 system which is used both in the form of a separate roller, or a roller/blade combination. The Polish army used another approach, fitting their combat engineer tanks with a pair of tubs on the rear that contained the PW-LWD explosive breaching system. This consisted of a rocket which propelled a line-charge hose filled with explosive. When detonated, the two parallel line charges cleared a path through the minefield.

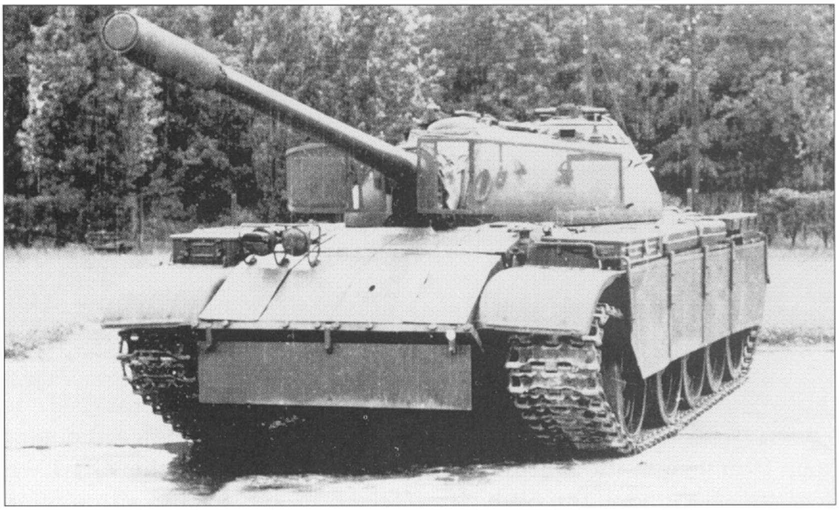
In the mid-1950s, the Soviet Army began to deploy the BTU (*buldozer tankoviy universalniy*, or "universal tank dozer"). This was a hydraulically operated 3.4-meter-wide dozer-blade intended for breaching anti-tank obstacles and similar combat engineer chores. It was followed in the early 1960s by the improved BTU-55 which was lighter (1.4 versus 2.3 tonnes). As in the case of other combat engineer equipment, there was some variation in other Warsaw Pact armies, with the Poles, for example, using their locally developed USCz-55 dozer-blade as well.



The most common of the T-55 mine trawls was the KMT-5 system. This Syrian T-55 was photographed on the Golan Heights in the wake of the 1973 war after the UN-sponsored ceasefire. (UN)

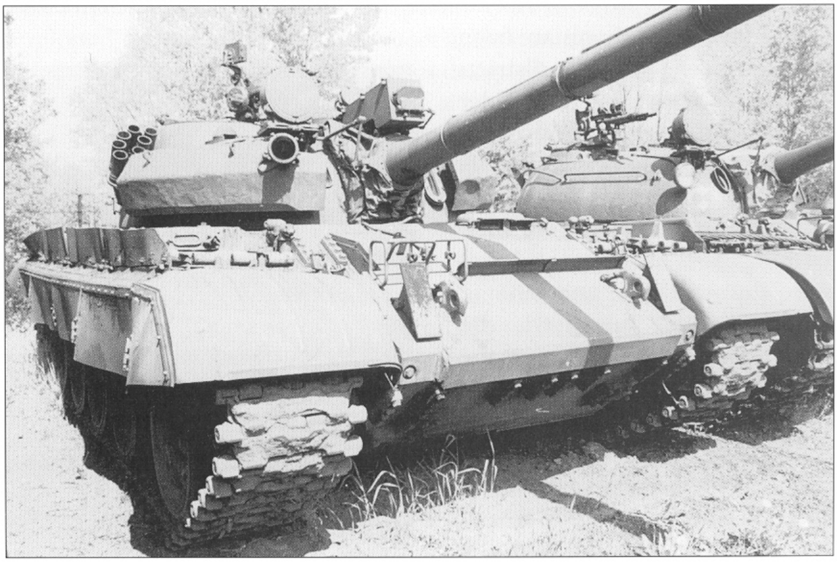
THE ULTIMATE T-55 TANK

In the late 1950s, Soviet leader Nikita Khrushchev became increasingly critical of the Soviet Army's obsession with its enormous tank fleet, arguing that they were dinosaurs doomed to extinction in the face of new anti-tank missiles. Soviet tank designers reacted in two ways: first, by adopting missiles for tank armament instead of guns, and by developing new types of armor to protect against anti-tank missiles. The most elaborate scheme to re-arm the T-55 with a missile system was the *Taifun* ("Typhoon") project by the VNII-100 armor development center in Leningrad. In place of the usual 100mm gun, a launcher was fitted inside the turret to fire the *Taifun* anti-tank missile. A total of ten *Taifun* missiles could be carried. Since this dramatically reduced the ammunition load of the tank, a supplementary 73mm Grom low pressure gun like that used on the BMP-1 infantry fighting vehicle was also fitted to the tank. Design work continued on this project until 1963 but was subsequently transferred to the newer *Obiekt 167* chassis. A less cumbersome proposal was the guided anti-tank missiles added to the tank armament as a supplement to the main gun, such as the 9M14 Malyutka (NATO: AT-3 Sagger). A program to adapt the Malyutka to the T-54B (*Obiekt 137Ml*) and T-55 (*Obiekt 155Ml*) was begun in July 1961 by the Vagonka design bureau teamed with the KBM missile design bureau. Two or three missiles were placed in an external launcher behind the turret. After Khrushchev was ousted from power in 1964, the missile programs were terminated.

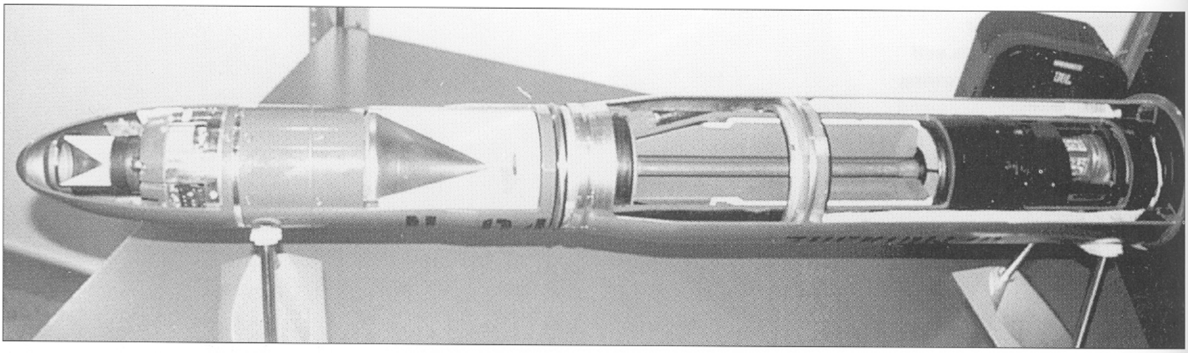


There were a number of experiments in the 1960s and 1970s to deal with the growing threat of anti-tank missiles and rockets. This Polish project used a passive armor appliqué on the hull front and side-skirts, and a stand-off screen around the turret. (Janusz Magnuski)

In spite of the Soviet Army's disdain for Khrushchev's missile obsession, there was widespread recognition of the need for improved protection against missiles and rockets using shaped-charge warheads since these could penetrate far more armor than conventional tank guns. New laminate armors were found to be effective in degrading the effect of shaped-charge warheads, and these were incorporated into the new T-64 tank. In parallel, Soviet engineers began to examine other protective methods that could be added to the existing tank fleet. The first of these schemes was the 1964 program to develop the ZET-1 (*zashchita ekrannaya tankovaya,* or "tank protective screen"). To protect the tank from frontal attack, a folding screen was designed that was attached to the forward section of the main gun. This screen folded like an umbrella when not in use, and in combat was unfolded. The wire mesh was sufficient to detonate incoming shaped-charge warheads, such as those on anti-tank missiles, anti-tank rockets, and even tank rounds. In addition, small aluminum "flipper" panels were fitted to the hull side.



The T-55M/AM program aimed at a deep modernization of the T-55 series. This particular example is a tank sold to Poland that formed the basis for its T-55AM-2 upgrade program. It shows some of the distinctive elements of the program, such as the "brow" armor, KTD-2 laser rangefinder, side skirts, Tucha smoke mortars, and thermal sleeve for the 100mm gun. (S. Zaloga)

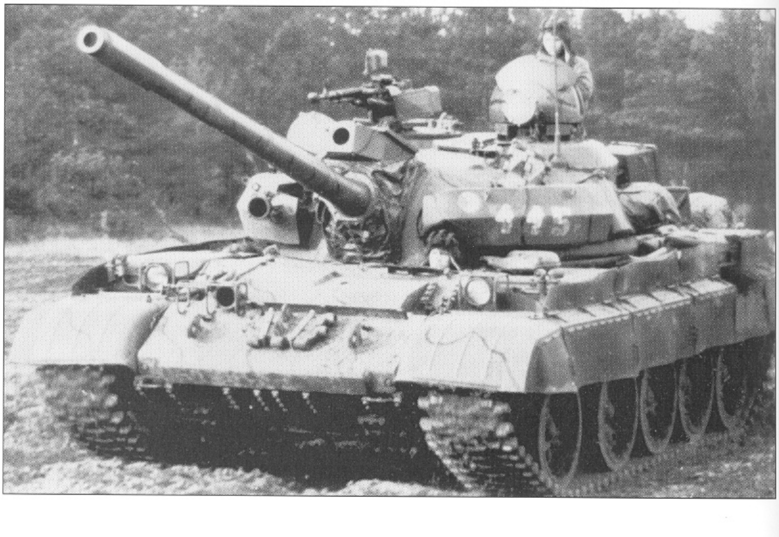


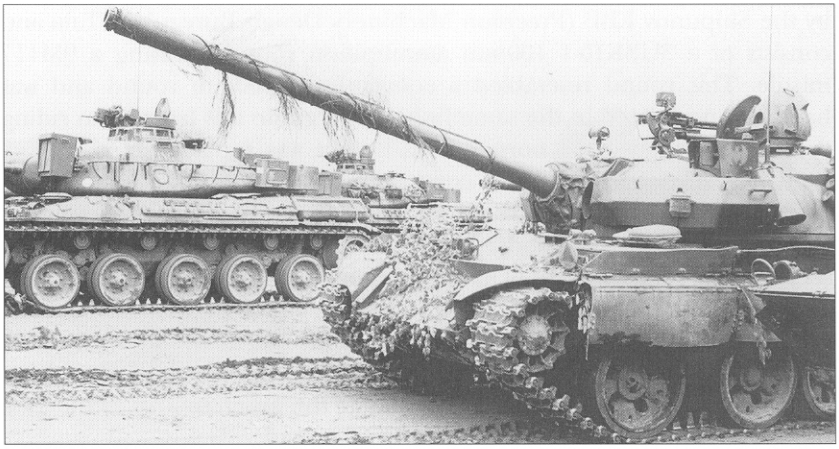
One of the innovations in the T-55 upgrade program was the new 100mm Bastion guided projectile. Although externally it resembled a normal 100mm projectile, it was, in fact, a rocket-propelled missile using laser guidance, as this cross-sectional model shows. (S. Zaloga)

These folded flush against the side of the tank when not in use, but in combat were folded outward to protect the lower hull sides. Although a state commission thought the idea worthy of adoption, the ZET-1 was ignored by the tank force which preferred to wait for the adoption of integral laminate armor on the new T-64 and T-72 tanks. Both the T-64 and the early T-72 adopted the flipper panels from this program, but not the front screen. The anti-tank missile threat became all the more apparent in the early 1970s with the effective American use of TOW anti-tank missiles against North Vietnamese T-54A tanks during the 1972 offensive, and the Egyptian use of Soviet Malyutka anti-tank missiles against Israeli tanks in the 1973 war.

Even after the advent of the T-72 tank in the 1970s, the Warsaw Pact had tens of thousands of the older T-55 tanks in service. As late as 1988, the T-54/-55 made up 36.5 percent of the Soviet tank park and the T-62 a further 25.7 percent; they were an even larger fraction of the other Warsaw Pact armies. By the early 1980s, many of the Warsaw Pact countries were suffering from severe economic stagnation and could not afford to replace all their T-55 tanks with the new T-72. With these factors in mind, the Soviet army began a program for a "complex modernization" of the T-55 and derivative types such as the T-62 in the late 1970s. The aim was to increase the combat effectiveness of the T-55 to levels similar to the T-72 but at a lower cost than the development of a new tank. This program was accelerated after the Soviet invasion of Afghanistan in 1979. The tank units committed to Afghanistan from the southern military districts were equipped mainly with older tank types such as the T-55 and T-62 which proved very vulnerable to RPG-7 anti-tank rockets and anti-tank mines. During the 1980 fighting, 16% of the tank losses were due to RPGs, and 59% to mines. On 25 July 1981, the Soviet government approved the modernization program as part of the 1981–85 five-year plan, authorizing the modification of 2,200 T-55 and 785 T-62 tanks through 1985. The KBTM design bureau in Omsk managed the

The Czechoslovak T-55AM2 had a number of differences from the Soviet original, most notably the use of the Kladivo laser rangefinder instead of the Soviet KTD-2, seen here over the main gun. It also used a locally developed wind-sensor on the turret rear, hidden here behind the tank commander. This shows a Czechoslovak T-55AM2 on summer maneuvers in the 1980s in the summer multi-tone camouflage scheme. (US DoD)





The end of the Cold War has led to incongruous scenes like this one, a Polish T-55AM2 operating alongside a French AMX-30B2 during joint NATO exercises in Poland. The Polish T-55AM2 shows several of the local modifications including the hammer-head wind-sensor, the laser warning receiver on the brow armor, and the Polish gunner's sight. The bat insignia on the side of the sight identifies it as belonging to the 6th "Pilsudski Legion" Armored Battalion, based at Walcz in Pomerania. (Wojciech Luczak)

program, though specialized Soviet bureaus did most of the development work. The upgrade package was accepted for Soviet Army use in April 1983 and the upgraded T-55 and T-55A tanks were designated respectively as the T-55M and T-55AM. This upgrade included passive appliqué armor, the Volna fire control upgrade, optional fitting of the new Bastion guided projectile, automotive upgrades, and numerous small improvements.

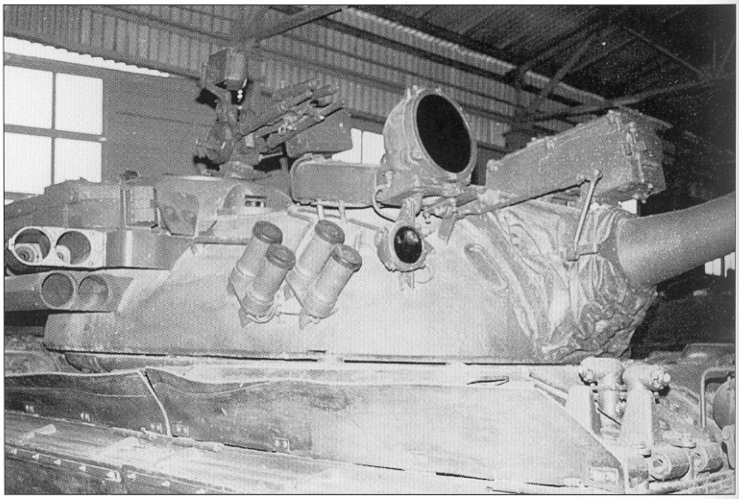
The appliqué armor was developed by NII Stali in Moscow. It was codenamed BDD though it was more popularly known as "brow" armor (*brovi*) because the turret panels look like a pair of eyebrows when fitted to the tank. The glacis appliqué is an armored box and inside are six layers of 5mm steel plate spaced 30mm apart with the cavity between filled with penapolyurethane. The turret panels are cast armor, 60mm on the outer side, with a similar layered interior, and the protection is similar to that provided by early versions of NATO Chobham armor. The new turret armor increases the tank's protection from its basic 210mm-thick steel to a steel equivalent of 380mm against kinetic energy projectiles, and 450mm against shaped-charge projectiles. An optional kit was also prepared to protect the rear of the turret and parts of the hull from RPG attack using several panels of lightweight grills, though this was seldom fitted except occasionally in Afghanistan. A special cellular armor package was developed for the tank belly to protect against mines consisting of a steel framework containing six 20mm plates designed to deflect the mine blast. The driver's seat was reattached to the side plate to reduce the likelihood of spinal damage when a mine exploded underneath. Side skirts were added to provide additional protection to the suspension and hull sides against shaped-charge warheads. For enhanced anti-radiation protection, improved anti-radiation lining was added to these tanks, and the crews were issued with IPZh-1 anti-radiation protective vests. The Type 902B Tucha smoke discharger system was included in the protective package which fires the 3D6 81mm smoke grenade to ranges of 200–350m. The total package added about 2.2 metric tons to the weight of the tank.

The new Volna fire control system was based around a KTD-2 laser rangefinder, the BV-55 analog ballistic computer, the improved TShSM-32PB gunner's sight with one-axis stabilization, and the upgraded Tsiklon M1 gun stabilization system. A portion of the upgraded tanks were modified to permit the use of the new Bastion guided 100mm tank-fired missile. The 9K116 Bastion 100mm guided projectile system was developed by the Shipunov KBP (Precision Machinery Design Bureau) in Tula and consists of a 3UBK10-1 100mm ammunition round encasing a 9M117 missile. This round resembled a conventional 100mm round and was handled and loaded in the same fashion. To guide this laser-beam riding projectile, the gunner's normal TPN-1 sight was replaced by the 1K13 sight. The missile is fired like a conventional round, with a rocket engine igniting 1.5 seconds after the round is fired. The sustainer rocket in the missile burns for six seconds. The missile has a flight time of up to 41 seconds, an effective range of 4km against both helicopters and tanks, and an effective penetration of 750mm against homogenous steel armor. Generally, the tank would carry four to six of the missile rounds in addition to its usual combat load. The main drawback to this weapon was its high cost: four missiles represented about double the purchase cost of the tank itself. On the other hand, it made up for the inadequate performance of the T-55 in long-range engagements with more modern NATO tanks without requiring the purchase of a new tank.

The T-55M upgrade also included automotive improvements. The V-55U engine was substituted for the previously standard V-55V. Road-wheel dynamic travel was increased through the use of new torsion bars and the modified tanks employed the new RMSh live track developed for the T-72. Other improvements on the T-55M/T-55AM included the substitution of a R-173 radio for the older R-123, and incorporation of features to defend the tank against napalm attack. Later in the program, the V-46 engine from the T-72 was retrofitted into these tanks. Modified T-55s with the V-46 engine were designated with a "-1" suffix such as T-55M-1, T-55AM-1.

Polish, Czechoslovak, and East German tank factories began a T-55 upgrade program in parallel with the Soviet T-55M/T-55AM upgrade in 1984–89. Both Czechoslovakia and Poland expressed interest in substituting locally developed fire control upgrades for the Soviet package. The Warsaw Pact configurations were designated as T-55AM2 without Bastion, and T-55AM2B with the Bastion system. Czechoslovakia substituted the *Kladivo* ("Hammer") system, which included a new laser rangefinder and wind-sensor, and this kit was also the basis for the East German T-55AM2 modification program. Poland developed the *Merida* fire control package, the *Bobrawa* laser warning system, and the *Erb* and *Tellur* smoke grenades. The Polish command versions were designated as T-55AD1M and T-55AD2M.

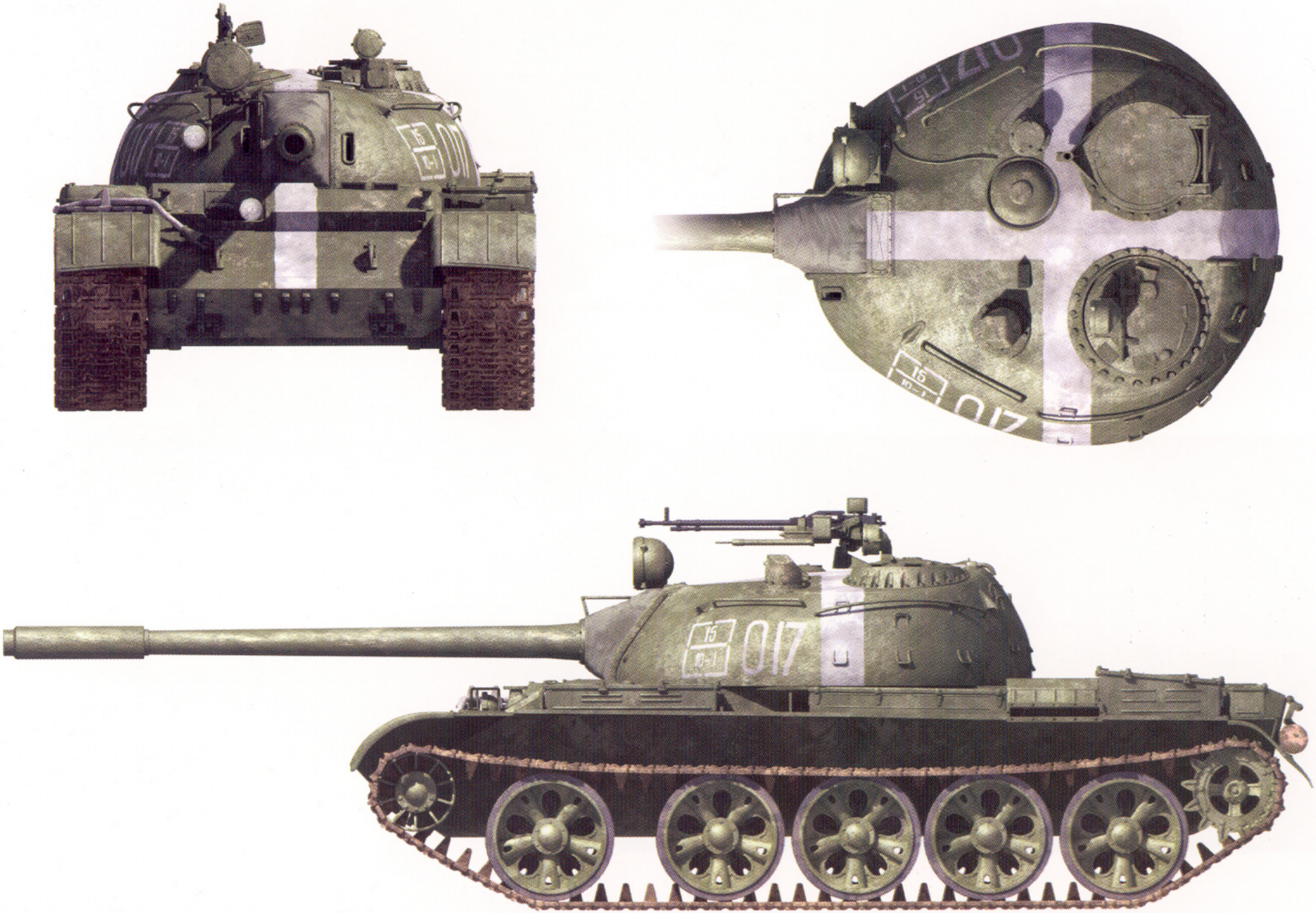
One of the most secret upgrades of the T-55 was the *Drozd* program, the world's first active protection system for tanks. The radar sensor on the turret side detected an incoming anti-tank missile, and automatically launched a special rocket with fragmentation warhead from one of the two launchers below it. (S. Zaloga)



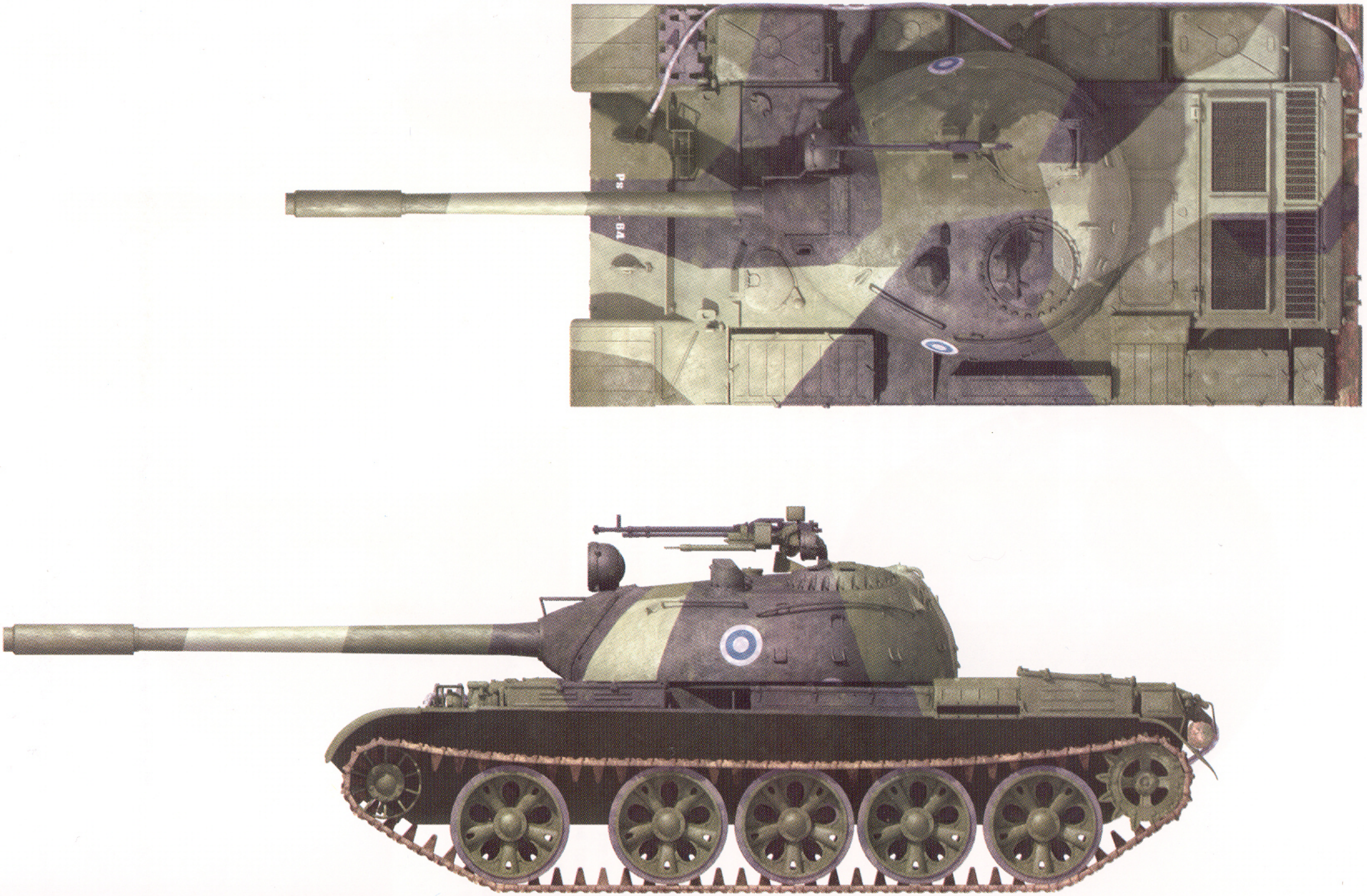
Secret "Thrush"

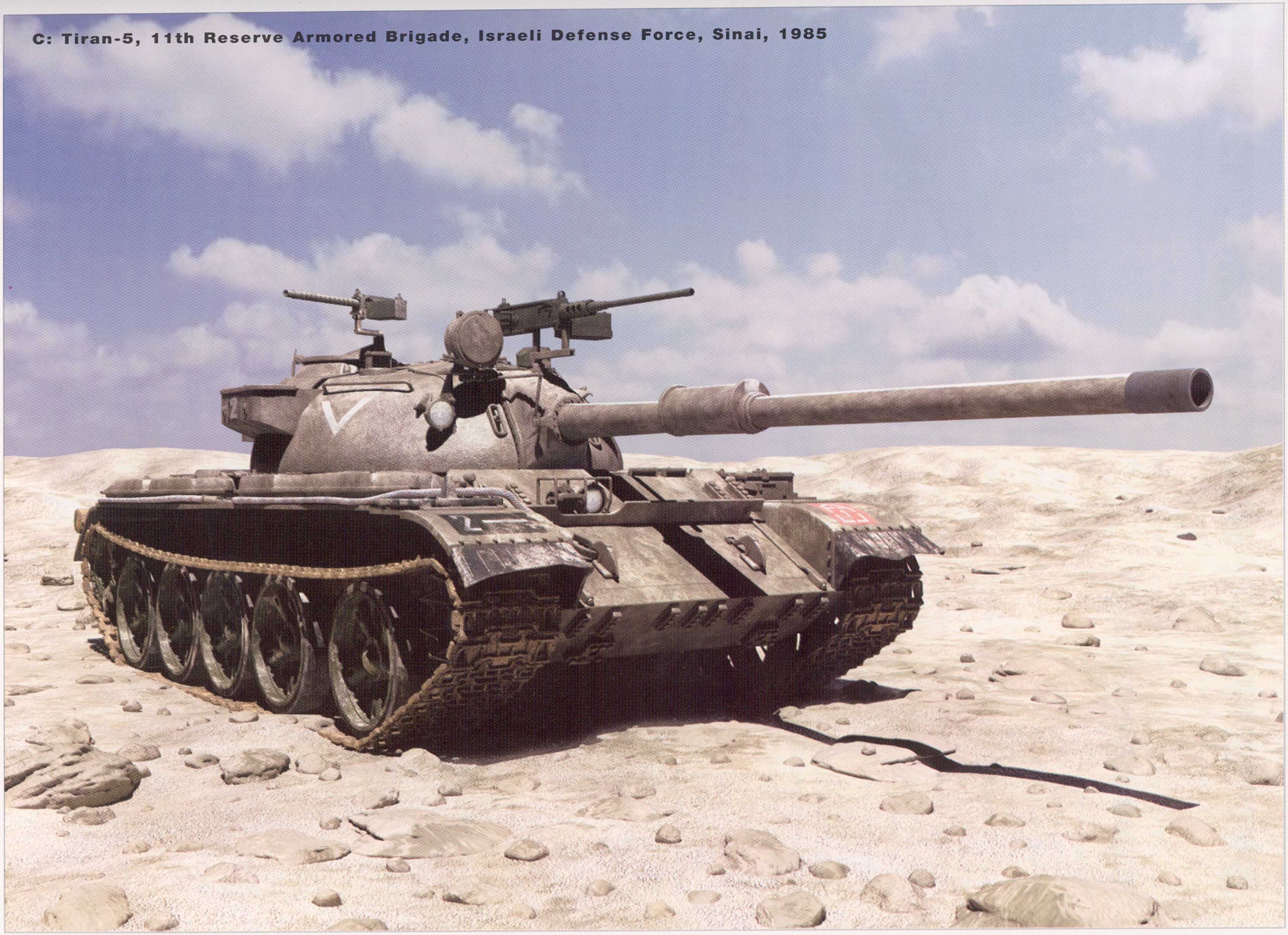
One of the most ambitious, expensive and secret T-55 upgrade efforts was the *Kompleks 1030M-01*, code-named *Drozd* ("thrush"). As an alternative to passive or reactive armor defense systems against anti-tank rockets and weapons, A. Shipunov's KBP design bureau developed the world's first active tank defense system. *Drozd* entered development in 1977 and the first prototypes were ready by 1978.

A: T-54B, Soviet 20th Guards Army, Operation Danube, Czechoslovakia, August 1968



B: T-55, 3./PsvP, Finnish Army, 1981



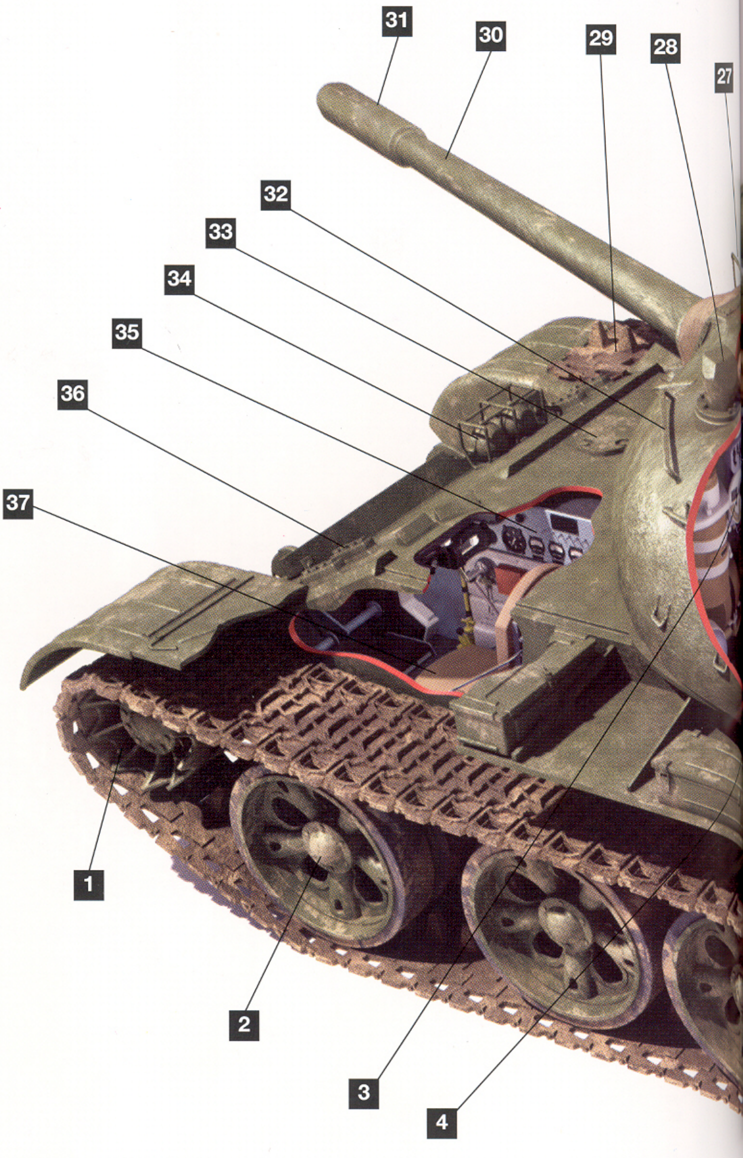


C: Tiran-5, 11th Reserve Armored Brigade, Israeli Defense Force, Sinai, 1985

D: T-55 TANK, SOVIET ARMY, 1970

KEY

1 Idler wheel
2 Road-wheel
3 Gunner's fire controls
4 Gun protective guard
5 Gunner's seat
6 Stowage bin for main gun tools
7 Engine exhaust port
8 Rear stowage bin for tools
9 Lubrication system radiator
10 Rear stowage bin
11 Drive sprocket
12 Unditching beam
13 Stowed snorkel for deep wading
14 External 200-liter fuel drums
15 Cooling fan
16 Transmission
17 External armored fuel tanks
18 Engine air filter
19 V-55V engine
20 Loader's protective guard
21 Loader's hatch
22 Pintle mount for anti-aircraft machine gun
23 Loader's MK-4 periscope
24 D-10TS 100mm gun
25 Gun recoil cylinders
26 L-2G Luna infrared searchlight
27 Articulating rod for searchlight/gun alignment
28 Gunner's TShS-32PBM fire control sight
29 Spare track links
30 Main gun tube
31 Fume extractor
32 Turret hand-holds
33 Fuel cap for forward fuel cell
34 Headlights
35 Driver's controls
36 Attachments for mine-rollers
37 Driver's seat



SPECIFICATION

Crew: Four (commander, gunner, loader, driver)

Combat Weight: 36 tonnes

Power to weight ratio: 16.1hp/T

Overall length: 9m (hull 6.2m)

Width: 3.27m

Height: 2.7m (with MG, 2.35m without)

Engine: V-55V 580hp (427kW) liquid cooled V-12 diesel

Transmission: Synchronized constant mesh with planetary final drives, 5 forward, 1 reverse gear

Fuel capacity: 960 liters integral, plus two 200-liter external drums

Max. speed: (road): 50km/h; (cross-country): 30km/h

Max. range: 500km (integral); 700km with external drums

Fuel consumption: 1.92 liter per km

Ground clearance: 425mm

Armament: 100mm D-10T2S rifled gun.

Main gun ammunition: 43 rounds, typically: 6 x UBR-412 HEAT; 9 x 3UBM6 HVAP; 28 x UOF-412 HE-Frag

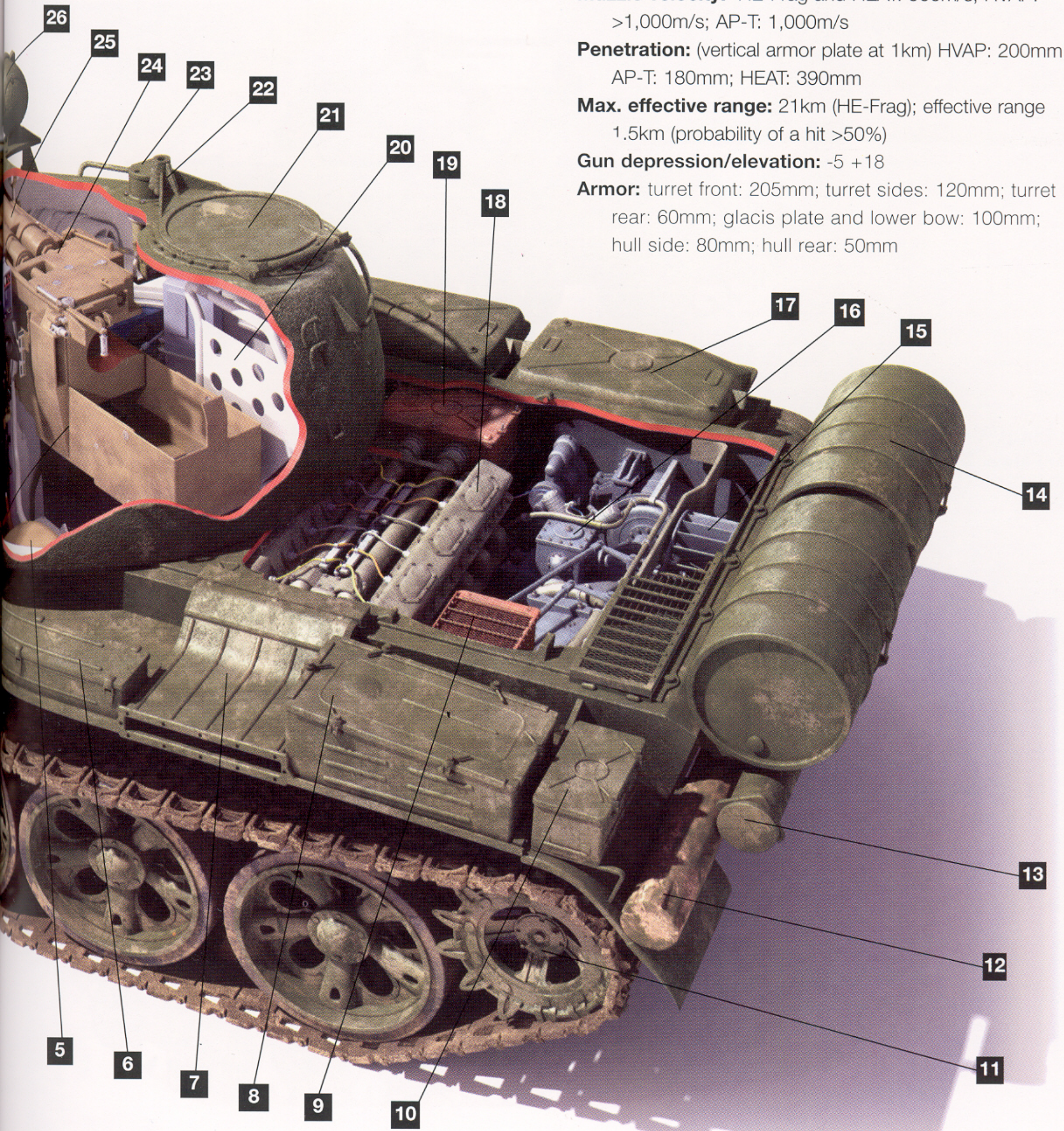
Muzzle velocity: HE-Frag and HEAT: 900m/s; HVAP: >1,000m/s; AP-T: 1,000m/s

Penetration: (vertical armor plate at 1km) HVAP: 200mm; AP-T: 180mm; HEAT: 390mm

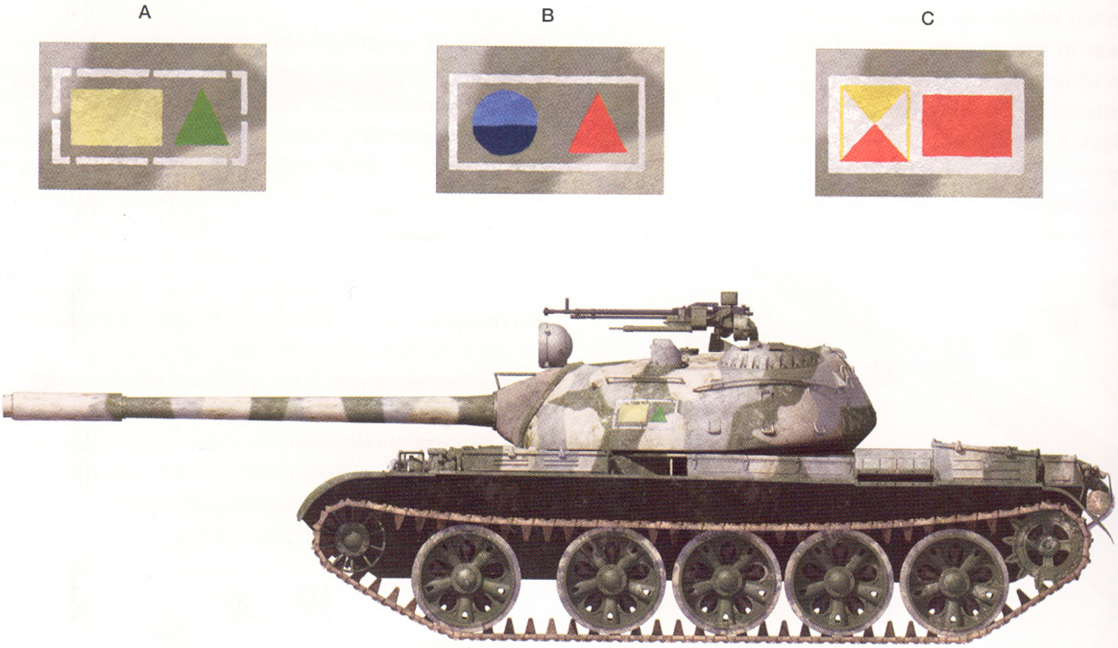
Max. effective range: 21km (HE-Frag); effective range 1.5km (probability of a hit >50%)

Gun depression/elevation: -5 +18

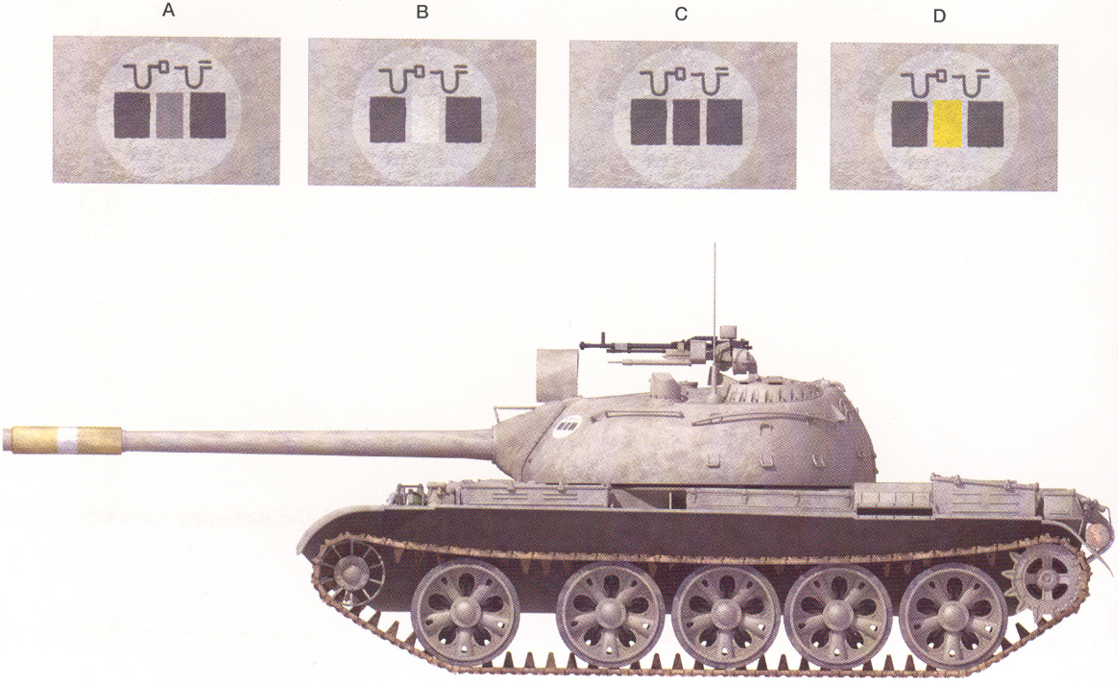
Armor: turret front: 205mm; turret sides: 120mm; turret rear: 60mm; glacis plate and lower bow: 100mm; hull side: 80mm; hull rear: 50mm

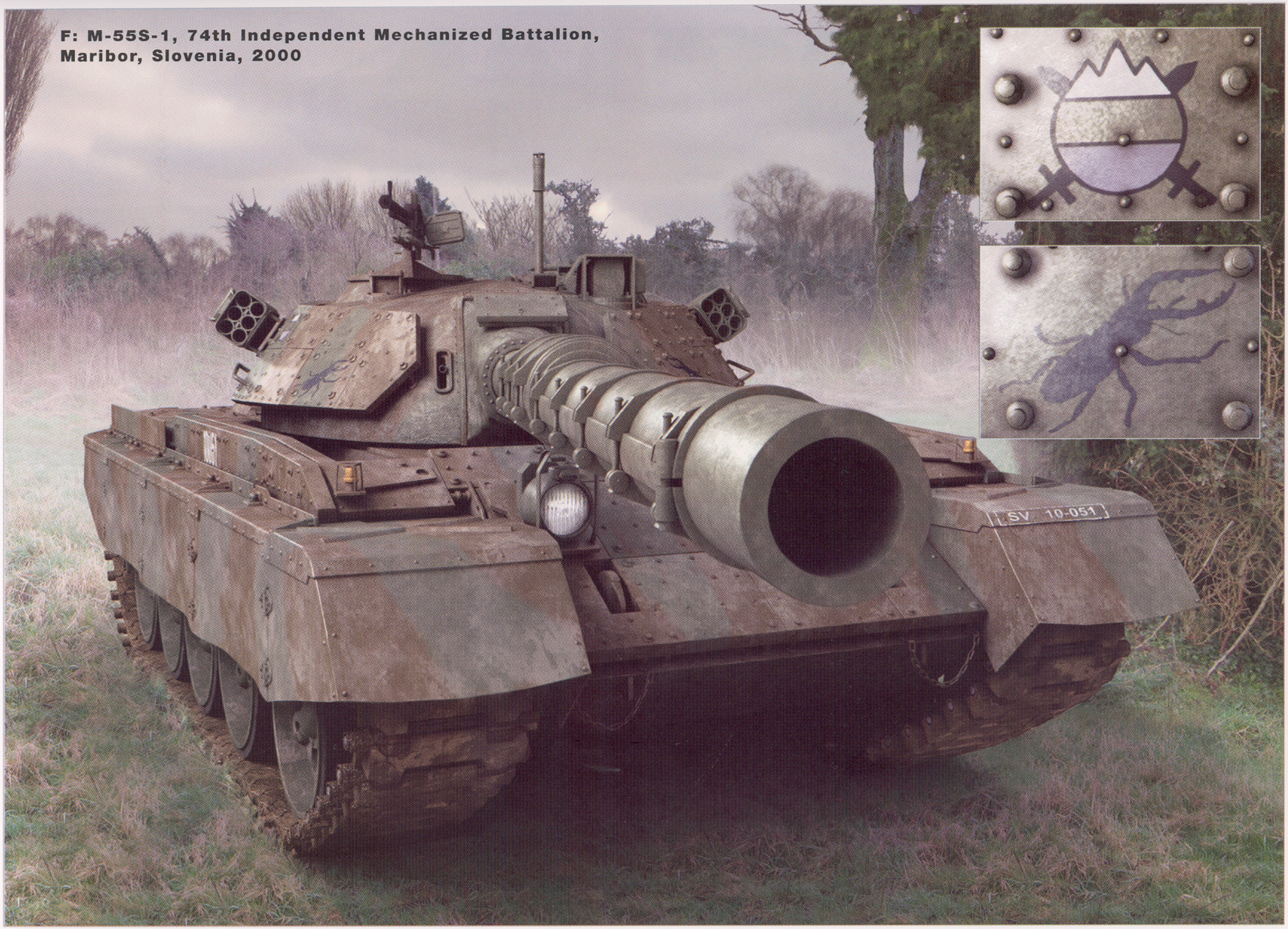


E1: T-54M, Syrian 5th Infantry Division, Ramtha, Jordan, 1970

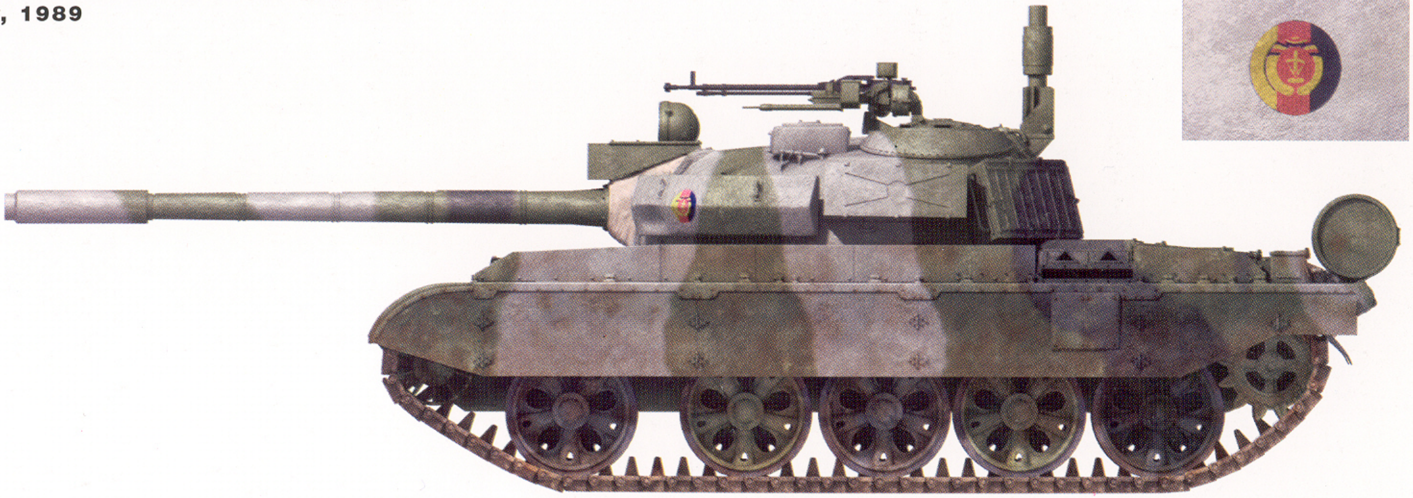


E2: Iraqi T-55, 1/12th Brigade, 3rd Saladin Armored Division, Operation Desert Storm, February 1991

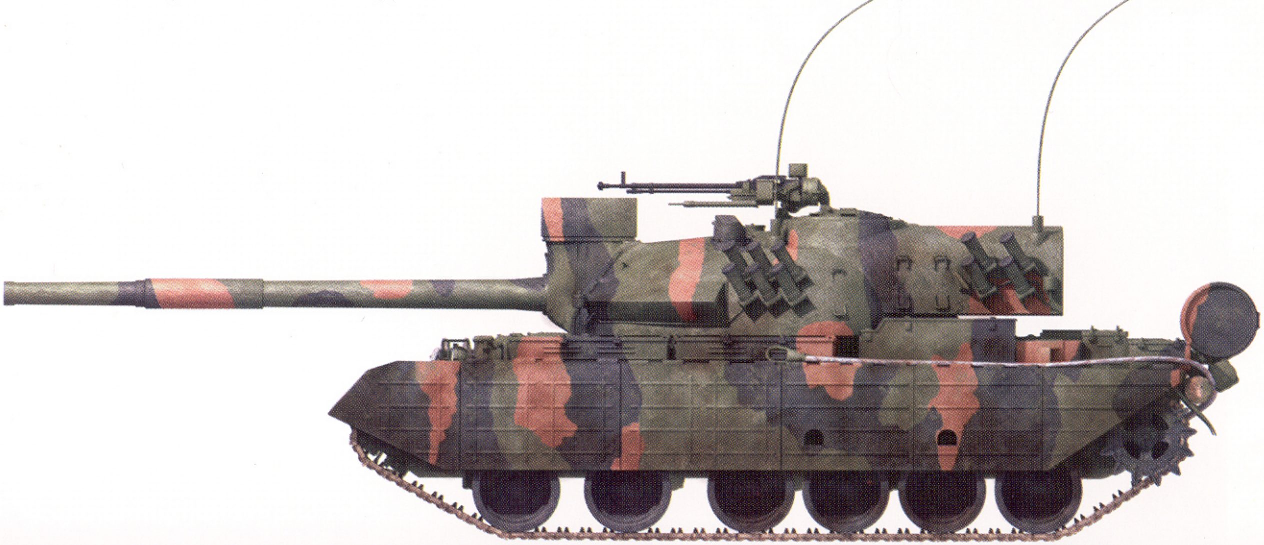


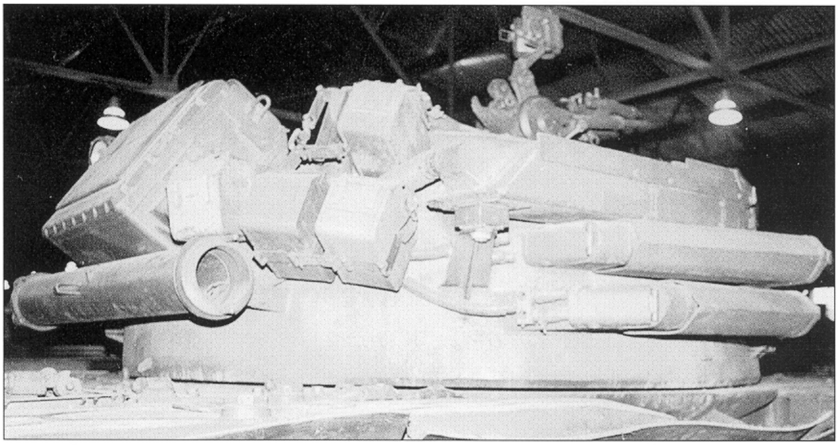

F: M-55S-1, 74th Independent Mechanized Battalion, Maribor, Slovenia, 2000

G1: T-55AM2B, National Peoples Army (NVA), East Germany, 1989



G2: TR-85M1, Romanian Army, 2000





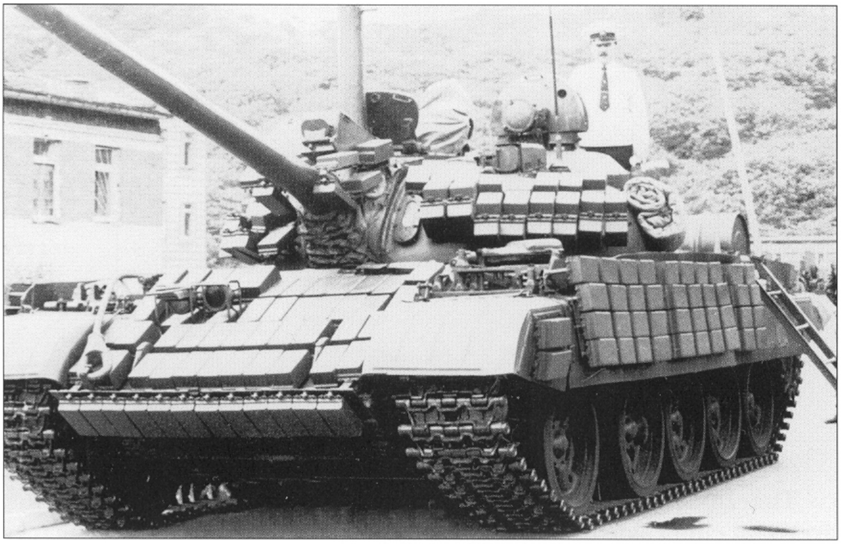
This view shows more details of the *Drozd* system, including the added electronics package on the rear of the turret above the OPVT snorkel. (S. Zaloga)

The *Drozd* system consists of three main elements, two launcher arrays on either side of the turret and an auxiliary power unit on the rear of the turret. Each launcher array consists of four launcher tubes and a Doppler radar sensor array above. The radar sensor arrays actively emit a pulsed 24.5GHz radio beam forward of the tank. The radar is gated to acquire targets moving at speeds of 70 to 700 meters per second to avoid engagements of small arms and other high-speed projectiles. On acquiring the incoming missile, the *Drozd's* computer determines which of its eight projectiles to launch. The radar system determines the range of the incoming missile or rocket, and the computer calculates when to fire the 107mm 3UOF-14 projectile, and does so automatically when the missile is about 7m from the tank. The warhead has a pre-fragmented steel casing which on detonation breaks up into 3-gram slugs which destroy the incoming missile.

The Soviet Army lost interest in the *Drozd* because of its cost and complexity, but the program was supported by the Naval Infantry. The Soviet Naval Infantry was having difficulty replacing its T-55 tanks as later types, such as the T-72, posed weight and size problems in standard navy amphibious ships and landing craft. The $170 million cost for *Drozd* development was less than developing a new tank tailored to the needs of the Naval Infantry. Modification of T-55 tanks with the *Drozd* took place at the Lvov tank rebuilding plant on a limited scale in 1981–82. The *Drozd* tanks also received the numerous T-55M/AM upgrades including the Bastion guided projectile feature but without the armor package, and when fitted with the V-46 engine, the designation became T-55AD1. Total *Drozd* production was small, about 250 systems. It was not actively deployed by the Navy in peacetime, being kept in storage due to reasons of secrecy. By the late 1980s, when *Kontakt* reactive armor became available, the Naval Infantry switched to T-55 tanks with reactive armor as a more practical alternative to the cumbersome *Drozd*. *Drozd* systems were exported in small numbers to China and to one undisclosed Middle East client.

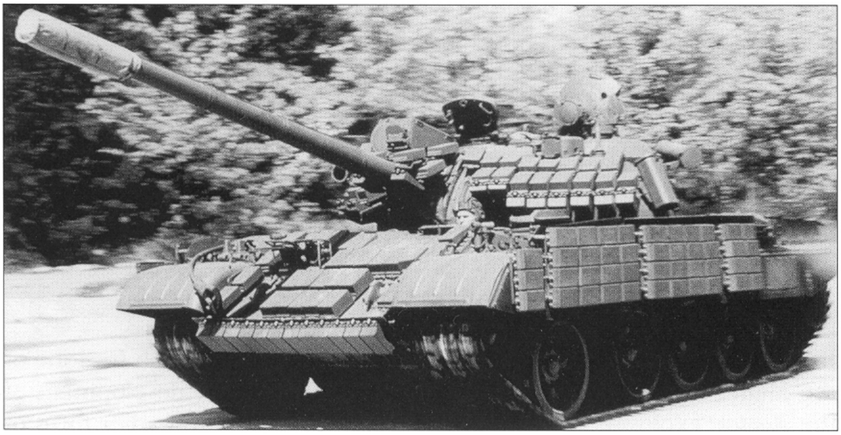
Explosive protection

In 1983, the NII Stali in conjunction with the NIIBT Research Institute of the Main Armor Directorate at Kubinka completed the development of the *Kontakt* explosive reactive armor (ERA) for tanks. An earlier form of



The T-55AMV incorporates the *Kontakt* explosive reactive armor instead of the passive "brow" armor of the T-55AM. This example displays the other upgrades including the 1K13 gunner's sight for use of the Bastion guided projectile, the new RMSh tracks, and the KTD-2 laser rangefinder. It is seen here in service with a Soviet Naval Infantry regiment in the 1980s. (US DoD)

reactive armor had been developed in the 1950s but the Soviet Army resisted adopting it until 1982 when the Israeli army used their own Blazer ERA during the 1982 Lebanon war. Reactive armor is intended to protect the tank against missiles and rockets fitted with shaped-charge warheads. The reactive armor box, called *kostek* ("dice") by the Russians, consists of an outer steel container which protects the contents from small arms fire, and an internal steel plate with a layer of plastic explosives underneath. When the box is struck by a shaped-charge warhead, the explosive panel detonates, pushing the steel plate up into the path of the jet of particles from the shaped-charge warhead. The interaction of the jet and plate severely degrades the penetrating power of the shaped-charge warhead. Russian accounts claim that *Kontakt* is about 10 percent more effective than Israeli Blazer armor. When retrofitted with *Kontakt* reactive armor starting from 1985, the T-55 tanks received the "V" suffix for *vzryvnoi*, or "explosive", such as T-55MV, T-55AMV; those with the V-46 engine upgrade were designated as T-55MV-1 and T-55AMV-1. The *Kontakt* reactive armor underwent several generational changes to the actual explosive element, but this is not immediately apparent as the same external boxes have been used. The first generations which used the internal 4S14 and later 4S20



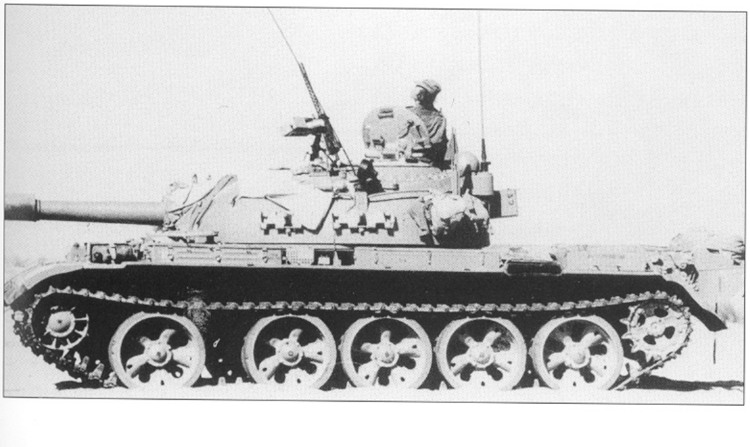
Ukraine was the center for many of the T-55 rebuilding efforts, including the T-55AMV tank with *Kontakt* reactive armor. This is an example with the full suite of *Kontakt* reactive armor in place. (Ukrspetseksport)

explosive element were designed only to degrade shaped-charge warheads. The improved 4S22 element was also designed to degrade kinetic energy projectiles. The Soviet Naval Infantry adopted *Kontakt* ERA on their T-55 tanks but it was not widely used by the Soviet Army T-55 tanks prior to the collapse of the Soviet Union in 1991. In 1993, the Czech Republic showed its own local version of reactive armor on a T-55 tank at the IDET trade fair, and Poland also developed its own type. In 1994, NII Stali unveiled a version of the T-55 tank fitted with its new passive/reactive *Kontakt*-5 armor, originally developed for the T-80U. This was not adopted by the Russian Army but was intended for export clients. A more elaborate upgrade for the T-55 including this feature was offered by the Omsk tank plant in the late 1990s, variously called T-55AM and T-55M5.

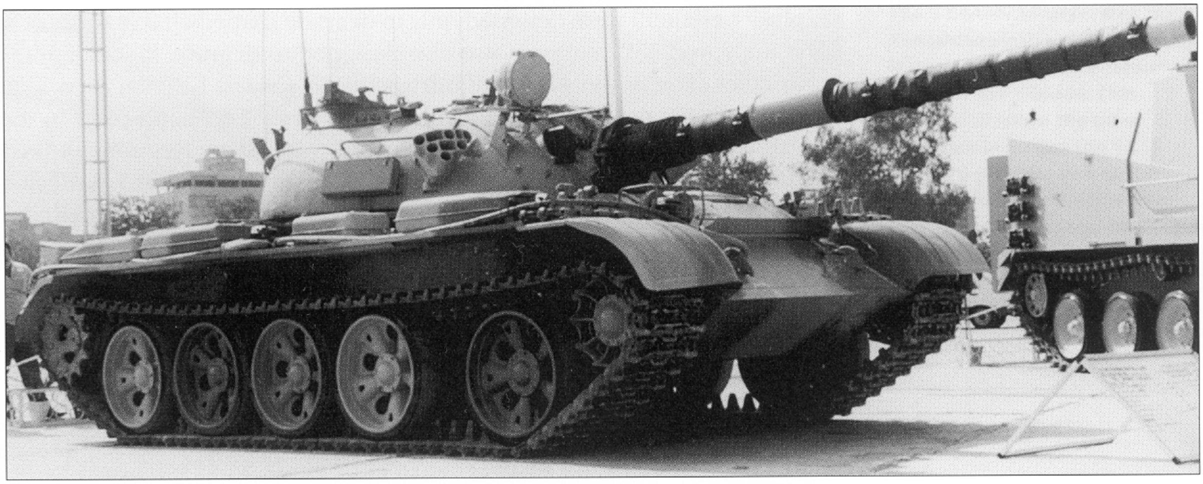
FOREIGN T-55 UPGRADE PROGRAM

The widespread deployment of the T-54 and T-55 around the globe, and their longevity in service has led to a large number of efforts to improve and modernize the design beyond those programs sponsored by the Soviet Army. One of the first countries to undertake an extensive upgrade effort was Israel. During the 1967 war, Egypt lost 291 T-54A and 82 T-55 tanks, and the Israeli Army was able to recover and repair a portion of these. The initial effort was mainly aimed at bringing the tanks to a workable condition and adapting them better to Israeli needs by fitting them with standard radios, machine guns, and stowage. They were referred to as Tiran-4 for T-54A derivatives and Tiran-5 for the T-55, though sometimes they were called Ti-67. Starting in 1969, some were rearmed with a modified NATO 105mm gun with the breech reversed to permit loading from the right side. Efforts were also gradually undertaken to make the tanks look more Israeli and less Soviet by fitting stowage bins on the turret and hull rear to change their silhouette. These tanks were placed in war reserve, and a small number saw use with the 11th (Reserve) Armored Brigade fighting in the Sinai in the 1973 war. The T-54A/-55 was not popular in Israeli service because of its cramped interior and the problems posed when operating equipment which resembled that of the enemy. As a result, there was little subsequent combat use of these tanks. However, they were gradually improved, and remained as an item of war reserve. In the 1980s, some were handed over to Allied Lebanese units, taking part in the civil war there for more than a decade. In the 1990s, the Israeli Army decided to use the T-55 chassis to form the basis for a new heavy infantry fighting vehicle, the *Achzarit,* and these have seen extensive combat use in recent years during the Palestinian intifada on the West Bank.

Israel modified captured T-54A and T-55 tanks into the Tiran-4 and –5. In 1969 some were upgunned with a 105mm cannon as seen here on a tank of the 11th (Reserve) Armored Brigade during fighting in the Sinai in 1973. (Israeli GPO)



By the 1980s after the peace accord with Israel, Egypt still had a large force of T-54A and T-55 tanks, and was estranged from the Soviet Union. Egypt sought Western help



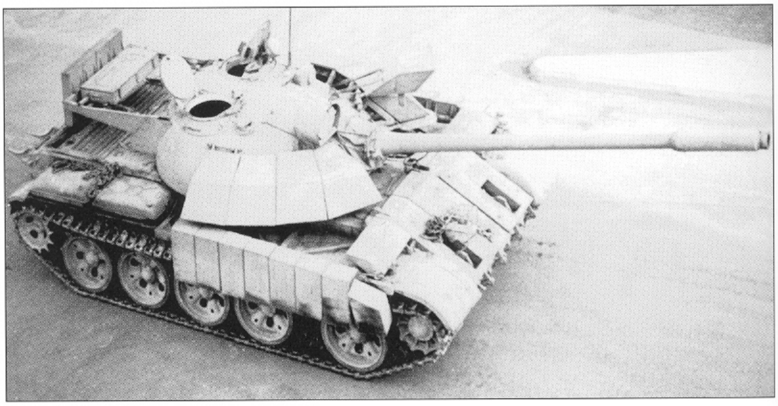
An Egyptian requirement for a large-scale upgrade of its T-55 fleet led to many foreign competitors developing modification kits. This example by Britain's Royal Ordnance substituted the NATO-standard 105mm gun and included many fire control improvements. (C. Foss)

in modernizing their Soviet tanks rather than buying new machines. As a result, a number of British, French, German, and American firms developed upgrade packages for the Soviet type. One French engineer interviewed at the time by the author thought that the whole program was a scam by the Egyptian Army, with many Egyptian officers getting delightful expenses-paid junkets to London and Paris. In the event, no serious funding was made available to rebuild the tanks, and instead the Egyptian Army later received a substantial amount of US equipment such as M60A1 tanks after the Cold War ended. Few of these upgrade packages proceeded beyond the prototype stage, as most T-55 operators could not afford to pay $250,000 to upgrade a tank that was purchased for only about $50,000 when new. The Egyptian Army later began a program of less extensive upgrades to their T-55 fleet.

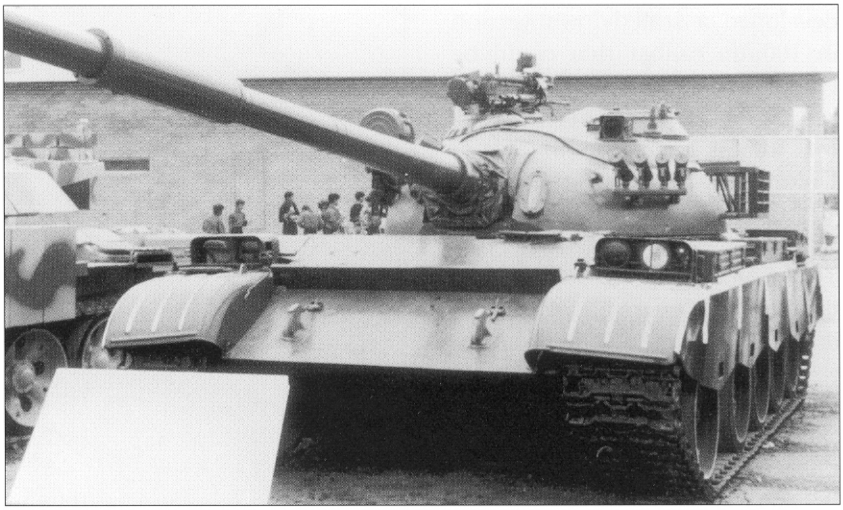
In the late 1980s, Iraq began to develop its own upgrades for its T-55 tanks, as well as for the related Chinese Type 59 and Type 69. One of the more successful was an effort to develop a simple equivalent of the Soviet "brow" laminate armor. Although bulkier and more cumbersome than its Soviet equivalent, the Iraqi appliqué was fitted to a small number of tanks prior to the 1991 Gulf War. During combat use in the battle near Khafji in 1991, the armor proved effective in defending the tank against Milan anti-tank guided missiles. The Iraqis prepared several other upgrade packages, including a version fitted with a Soviet 125mm gun, but these did not progress beyond prototypes.

Some European operators of the T-55 continued to upgrade their tanks after the collapse of the Soviet Union in 1991. The Finnish Army had an extensive modernization effort in the 1980s and 1990s to keep their T-55 force viable. Some of the former Warsaw Pact countries such as Poland continued to develop improvements for their T-55 tanks, although these gradually evaporated due to cut-backs in

Immediately before the 1991 Gulf War, Iraq improved a small number of its T-55 and Type 69 tanks with a set of passive laminate armor which offered protection similar to that of the Soviet T-55M brow armor. These tanks were used by headquarters units of the 15th Mechanized Brigade of the 5th Mechanized Division during the fighting around Ras al-Khafji in January 1991 where this particular example was captured. (US Army)



One of the more extravagant Iraqi upgrades for the T-55/Type 69 was this scheme to mount a 125mm gun. Due to the enormous size of the gun breech, the turret roof panels were cut free and remounted on a new combing about six inches higher than the original. This particular example, based on a Chinese Type 69, was displayed in Baghdad before the 1991 war, and may have been the only example actually converted. (C. Foss)



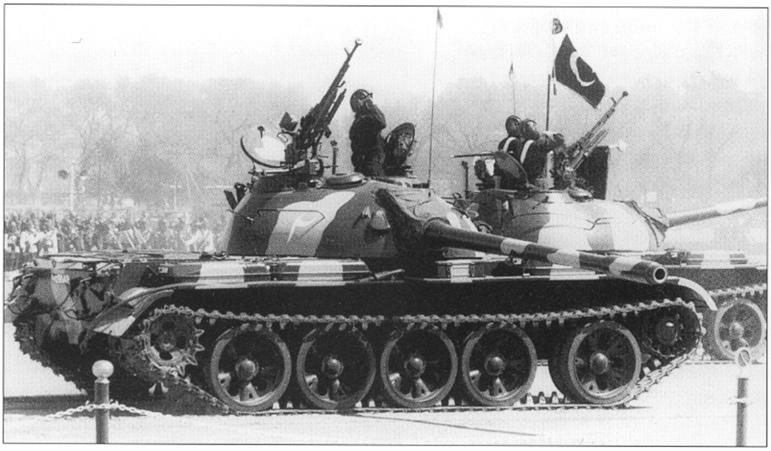
funding and the gradual retirement of the type from service due to its age and the shrinking size of armies in Europe in the wake of the Cold War. Not surprisingly, both Russia and Ukraine have offered upgrade packages since the 1990s. In Russia, the Omsk tank plant has remained active in trying to revive interest in T-55 upgrades. They have displayed various packages, including the T-55M5 with *Kontakt*-5 appliqué armor, and the more elaborate T-55M6. An even more extensive package has been offered, which substitutes a new turret with an autoloader and a 125mm gun. For armies no longer interested in the T-55 as a tank, Omsk has developed the BTR-T heavy infantry transporter and a similar armored scout vehicle based on a turretless T-55 chassis. Ukraine still has an extensive network of rebuild plants, and has been offering to upgrade older T-55 tanks with reactive armor, fire control improvements, or other modifications.

THE CHINESE TYPE 59 AND TYPE 69

China became the second largest manufacturer of the T-54A series after the Soviet Union, and had the series in production longer than any other country. Production of the T-54A in China centered on Factory No. 617 in Baotou in Inner Mongolia, to the west of Beijing. The People's Liberation Army (PLA) designated the Chinese-manufactured T-54A tank as the Type 59 and it was also known by its industrial designation of WZ120. The Type 59 was essentially similar to the T-54A, though it lacked features such as the gun stabilization system. The first Type 59 was completed in December 1958. It remained in production into the early 1980s and during the course of production the improved Type 59-I (WZ120A) was manufactured.

China began the development of a new main battle tank in 1963 but the Cultural Revolution brought this program to a near standstill. The PLA captured a Soviet T-62 tank during the 1969 fighting with Soviet troops along the Ussuri River in March 1969 and decided to incorporate many of the advances found in the T-62. The resulting Type 69 tank was essentially similar to the Soviet T-55, though not identical. It was not ready for service until 1974, more than a decade after its Soviet counterpart. Instead of directly copying the Soviet T-62's smoothbore 115mm gun, Factory No. 617

developed a scaled-down version in 100mm caliber that could be readily adapted to the Type 69 without the extensive hull changes that were necessary in the Soviet Union's transition from the T-55 to T-62. The Type 69 with the 100mm smoothbore gun was designated as Type 69-I (WZ-121) and was first displayed in September 1982. It does not appear that this version was particularly successful and there is little evidence it went into widespread Chinese service. After their unhappy experience with the smoothbore gun, the Type 69-II (WZ121A) retained the standard 100mm rifled gun but with improved ammunition and fire control improvements. The Type 69-II was also the first member of the Type 59/69 family to use active infrared night-fighting equipment copied from the Soviet Luna type. Although most of the technology on the Type 69-II was based on Soviet patterns, the Chinese did introduce some of their own features after production started. Turret protection was improved using stand-off panels nicknamed "grid shields" or "boom shields". These were a set of armored louvers mounted about 18 inches from the turret sides, intended to prematurely detonate HEAT warheads. This was prompted by Chinese recognition of the vulnerability of their tanks to RPG fire after the 1979 war with Vietnam. Some Type 69-IIs had only a rear-mounted set of the grid shields, while others have a full set of grid shields that encompass the turret. Other later additions to the Type 69-II were an array of smoke grenade launchers on the turret, a new rubber skirt shield, and a new double-pin rubber track. There was a wide range of detail differences on this tank family since China offered many options to its export clients. Two Type 69-II command tank versions were developed, the WZ121B and WZ121C, with different radio configurations.

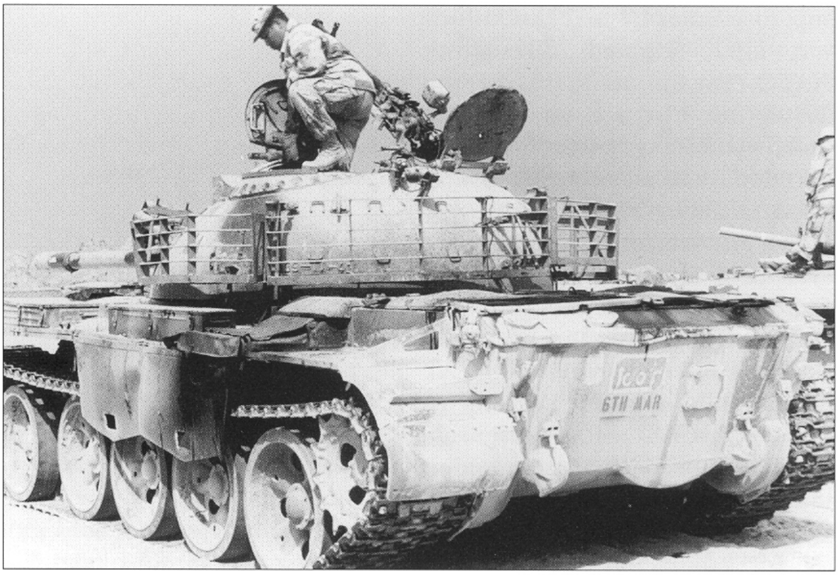


The Chinese Type 59 was a license-built copy of the Soviet T-54A tank with some modest detail differences. China's most significant export client for the Type 59 was Pakistan, and here a pair of Type 59 tanks are seen on parade in the 1980s. (US DoD)

In parallel to the Type 69-II, Factory No. 617 decided to develop an export tank armed with a 105mm gun compatible with NATO ammunition for its foreign clients already using 105mm guns. Although called the Type 59-II (WZ120B), it was largely identical to the Type 69 except for the gun and the lack of the grid shields. The Type 79 (WZ121D) tank, originally called the Type 69-III, was an effort to merge the features of the Type 69-II with the improvements of the Type 59-II, namely the 105mm rifled gun. The Type 79 was accepted for service in 1984, but only 519 were built.

From 1980, Factory No. 617 began work on what it called a "second-generation" tank. The most noticeable change in this design was the adoption of a new suspension system based on captured American M48A3 Patton tanks obtained through North Vietnam. Development was completed in 1988 and it was referred to as the Type 80 or as Storm-1. Two versions of the Type 80 were built, the Type 80 and Type 80-II, with minor differences in the chemical protection suite. In recent years, the Type 80 has been called the Type 88 in official publications, following the usual Chinese pattern of designating the tank after the year in which it concluded development. China has not exported any significant number

The Type 69 tank closely resembles the Type 59 except in the later production batches which included external improvements such as the "boom shields" and side skirts, as seen here on an Iraqi Type 69 captured by the U.S. 6th Marines during Operation Desert Storm in 1991. Another distinctive feature of the Type 69 is the semi-circular protrusion on the lower rear hull plate to accommodate the new fan, a feature copied from the Soviet T-62. (USMC)



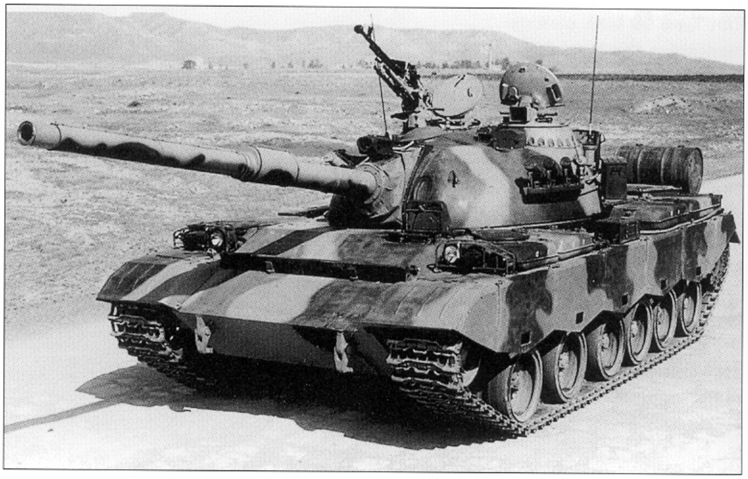
of Type 80/Type 88 tanks. This was the last of the Chinese tanks derived from the T-54 family. The subsequent designs were more strongly influenced by the Soviet T-72.

China began exporting its tanks in the 1960s and the single most important client for Chinese armored vehicles was Pakistan. After Pakistan's armored vehicle combat experience in the 1965 and 1971 wars with India, and its experience with US armored vehicles, Pakistan's views on armored warfare were fed back into the Chinese development process. The Pakistani Army soon realized that the Chinese tanks had serious durability problems and by 1971, the Pakistani Army set up a major tank rebuilding plant, the Heavy Rebuild Facility (HRF) in Taxila. By 1990, Pakistan was operating about 1,200 Type 59 tanks, most of which had been rebuilt and modernized at Taxila. Although early Chinese export sales were dominated by strategic and political factors, by the early 1980s, Chinese industry began to cater to the commercial arms market, unfettered by Maoist foreign policy. The conflict between Iran and Iraq attracted the most Chinese activity.

THE T-54/T-55 IN COMBAT

The first three T-44 tank brigades were formed on 15 September 1944 to train troops on the new tanks. Due to prolonged teething problems with the T-44, as well as a desire to keep the new design secret, the T-44 was not deployed in combat against Germany during World War Two. In fact, so far as is known, the T-44 was never used in combat.

The T-54 first saw action in 1956 during Operation *Vikhr* ("whirlwind"), the action to crush the Hungarian anti-communist uprising. Several of the Soviet tank divisions deployed there had been recently re-equipped with the T-54. A number of T-54 tanks were lost in combat, mainly to Molotov cocktails and Hungarian anti-tank guns. The Hungarians drove a captured T-54A into the grounds of the British embassy in Budapest, giving NATO its first detailed glimpse of the new type. This was the catalyst for Britain's superb 105mm L7 tank gun, which was later adopted throughout NATO. By the standards of the 1950s, the T-54 was an excellent tank, combining lethal firepower, excellent armor protection, and good reliability in a tank that was lighter and smaller than comparable Western designs such as the British Centurion or the American M48 Patton. On the negative side, the T-54 was forced to rely on HEAT ammunition in tank engagements due to the lack of effective sub-caliber armor piercing ammunition until the 1960s, and this type of ammunition was not particularly accurate at long ranges when used with the T-54's simple fire control system. In the Soviet view, most tank fighting in Europe would have been relatively short-ranged due to the terrain, and at typical ranges, the simple fire controls of the T-54A were adequate. Fortunately, war in central Europe never materialized and the T-54 and T-55 were never put to the test in the theater for which they were intended.

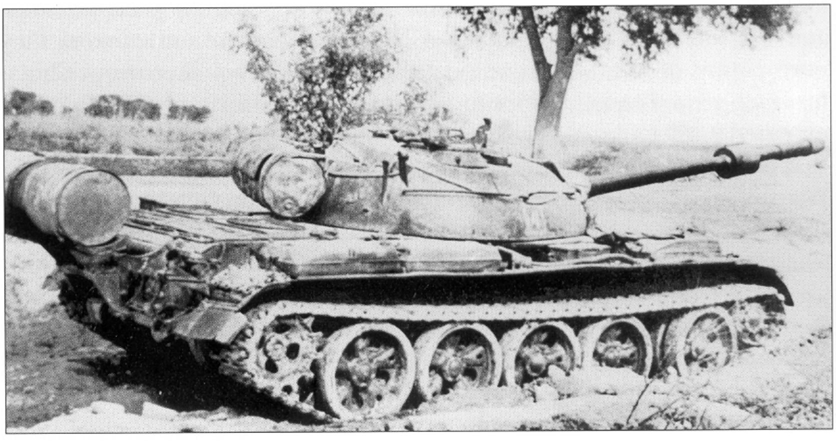


The final evolution of the Chinese Type 59 family was the Type 80. This version used a new suspension based on the American M48 Patton tank and it is armed with a NATO-compatible 105mm gun. (T. Desautels)

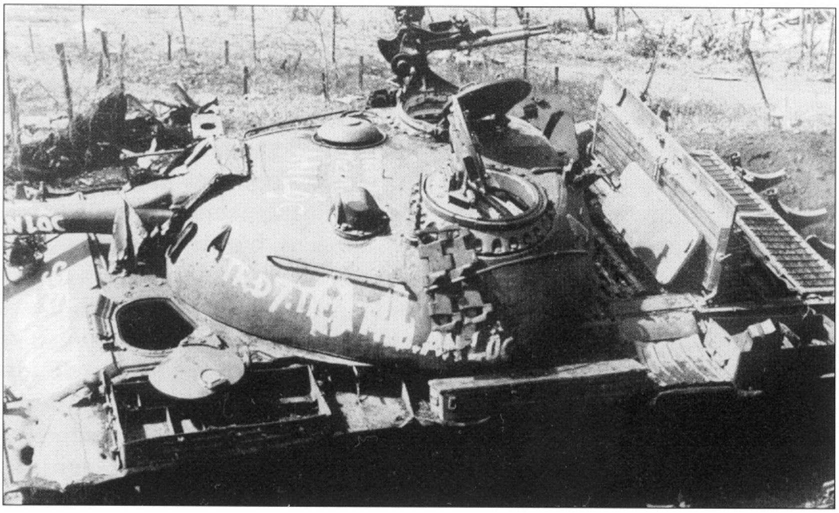
Instead, the T-54 and T-55 have seen combat in nearly every other area of the world. From 1950 to 2000, the Soviet Union and other Warsaw Pact manufacturers exported about 20,000 T-54 and T-55 tanks; in the same period China exported about 6,000 Type 59 and Type 69 tanks, making them by far the most common tank type outside Europe and the USA. The T-54A was shipped to Egypt and Syria from the early 1960s and took part in the 1967 war, although it had very little impact in the Sinai campaign, as the Egyptian tank divisions were routed after minimal fighting. Additional T-54A tanks of the Syrian 44th Armored Brigade fought on the Golan Heights, but once again, the Syrian tank force did not have a major impact on the course of operations. By the time of the 1973 October war, the T-54A and T-55 tanks formed the core of the Egyptian and Syrian tank forces, and they were involved in the largest and most violent tank battles since World War Two. Already more than two decades old by this time, the T-55 was past its prime. The Israeli Centurions had been uparmed with the 105mm gun and the newer M60A1 offered better armor and firepower than the T-55. Yet the T-55 was far from obsolete, and with the newer sub-caliber ammunition, was capable of penetrating the thick turret armor of the Israeli tanks at two kilometers. The most crucial determinant in the 1973 tank battles was the quality of the crews. The Israeli tankers were far better trained and led than their Arab opponents, most evident in the performance of the substantially outnumbered Israeli 7th Armored Brigade in the defense on the Golan Heights.

The conflict between India and Pakistan in 1971 was more evenly balanced, with Pakistan relying on the Chinese Type 59 and India deploying the T-54A and T-55. However, there were few of the large-scale tank battles of the sort that had characterized the earlier 1965 Indo-Pakistan conflict. The most extensive combat involving the T-54 and T-55 in Asia in the early 1970s was in Indochina. The North Vietnamese Army began receiving T-54A, T-54B, and Type 59 tanks in the late 1960s, and they were first deployed in combat in February 1971 during the fighting in Laos. By the time of the 1972 offensive, the NVA had three tank regiments in service, as well as some separate tank battalions. There were a number of engagements between T-54A and South Vietnamese M48A3 Patton tanks, with the better-trained South Vietnamese crews exacting a heavy toll during the fighting for Quang Tri. The South Vietnamese 20th Armored Regiment lost all of their tanks in the campaign, but destroyed about 90 T-54 and PT-76 tanks in the process. One of the most intense tank battles erupted around the provincial capitol of An Loc, where the T-54A and T-54B tanks suffered significant losses to a new battlefield innovation, the TOW wire-guided anti-tank missile. In total, the North Vietnamese lost about 400 tanks in the 1972 offensive, but were resupplied from China, allowing them to rebuild nine tank regiments. While the Vietnam War is popularly imagined as a guerrilla conflict, the 1975 campaign was fought in a conventional fashion, with the new North Vietnamese tank brigades forming the spearhead of the army that overwhelmed South Vietnam. Like the Japanese Army three decades before in Malaysia, the North Vietnamese ignored the dogma that tanks had no place in the jungles of southeast Asia, and demonstrated that armor could be valuable when skillfully used. North Vietnamese tanks again saw combat in 1979 during the short border war with their erstwhile ally, China, and most of the tank operations were in support of infantry and not in direct armor confrontations due to the terrain. Likewise, much of the subsequent fighting in Indochina, such as in Cambodia, saw some use of T-54A and Type 59 tanks in modest numbers, but generally for infantry support.

Africa has seen extensive use of T-54 and T-55 tanks from the northern reaches of the Sahara in Spanish Morocco and Chad, to the southern reaches of Angola and Namibia. In much of Africa the T-55 is synonymous with tank, being by far the most common type on the continent. In the post-colonial period after World War Two, many of the new states of Africa turned away from their former colonial overseers in western Europe to the Soviet Union for military aid. These aid packages usually contained T-54 and T-55 tanks, and by the mid-1970s, many African states had these types in service. As a result, during the incessant civil wars and conflicts in the last two decades of the 20th century, the T-54 and T-55 saw extensive combat use in Africa. Some of these conflicts, such the protracted war



India purchased a significant number of T-54A and T-55 tanks which took part in the 1971 war with Pakistan. To prevent possible misidentification with Pakistani Type 59 tanks, the India Army mounted a dummy fume extractor on the barrel akin to that of the NATO 105mm gun used on their Centurions. In addition, an empty drum was attached to the rear of the turret with a hinged panel both to change the silhouette of the tank and to provide extra stowage for the crew. This particular example is a T-54A. (George Balin)



Although most North Vietnamese tank units were equipped with the T-54A or Type 59 tank, a small number of T-54B tanks took part in the 1972 offensive including this tank, probably from the 171st Tank Battalion knocked out at An Loc in April 1972. As can be seen, the tank has the shelf for the Luna searchlight to the right of the main gun, but the searchlight itself has either been knocked off in combat or was left off. (Patton Museum)

between South Africa and Angola, saw numerous armored clashes, but in most cases the tanks were used in their traditional fashion, as a shock force to bolster the infantry. They were used by the Algerian-backed *Polisario* insurgents against the Moroccan Army in the war for Spanish Morocco in 1976–91, and during the civil war inside Algeria in the 1990s. The T-55 was used by Libyan forces during the war for Chad in 1981–87, as well as in some of the subsequent internal fighting. The T-54 and T-55 were a staple of the violent conflicts in Somalia, Ethiopia, and Eritrea as the Horn of Africa descended into violence over the last three decades. In sub-Saharan Africa, the T-54A and T-55 have been used in innumerable civil wars and conflicts especially in Uganda and Congo, as well as in the decades of bloodshed in Angola after independence in 1976. The T-55 has also seen combat in the Americas, most notably during the Nicaraguan civil war in the 1980s.

In recent years, the most extensive combat employment of the T-54 and its derivatives has been in and around Iraq. During the 1980–88 Iran–Iraq war, the Iraqi tank force was heavily centered on the T-55. As both sides exhausted their original inventories, they began to re-equip with whatever they could obtain on the arms market, including more T-55 tanks, as well as ample supplies of Type 69 tanks from China. Due to political considerations, Soviet arms supplies to Iran and Iraq were erratic. Iraq was looking for a reliable source of arms without ideological preconditions, and was willing to pay hard cash. Chinese tanks were attractive as they were copies of the Soviet tanks already in the Iraqi inventory. China, however, proved equally happy to sell tanks to Iran. During 1982–89, China exported 2,280 tanks, mostly Type 69, of which 85 percent went to Iran and Iraq. The T-55 and Type 69 were extensively used by Iraq in the 1991 Gulf War, mainly in regular army units; the elite Republican Guard units tended to have better tanks such as the T-72. By 1991 the T-55 was obsolete when facing modern types like the American M1A1 Abrams or the British Challenger, and they enjoyed few successes except for rare instances when facing units more poorly equipped than themselves, such as the Saudi National Guard at Khafji. Both the T-55 and the Type 69 were again present on the battlefield in the 2003 reprise against the US and British armies, and the results were as lopsided as before.

Even if the T-55 is obsolete when facing state-of-the-art tanks, it is still a viable weapon in many regions where it is often the most formidable weapon present on the battlefield. While the T-55 may be cannon-fodder against a modern army, it is an invulnerable monster when pitted against civilians and rag-tag militias. It has dwindled from frontline service in most well-equipped armies around the globe, but it lingers on in the backwaters. The T-55 was widely used in the Yugoslav Civil War in the 1990s by nearly all sides, including the Slovenes, Croats, Serbs, and Bosnian Muslim armies. Likewise, the type was extensively used in the conflicts in the Caucasus following the collapse of the Soviet Union, by Georgian, Abkazhian, Armenian, and Azeri armies. The T-55 is unlikely to disappear from the battlefield in the immediate future. Since the end of the Cold War, most of the former Warsaw Pact armies have retired them from frontline service, and often have sold their tanks rather than scrapped them. So the latest T-55AM2s have disappeared from Slovakia, ending up in Angola, and those from the Czech Republic are used in the Sri Lankan civil war. Ukraine has sold T-55 tanks to Uganda and Azerbaijan, while Belarus and Bulgaria have replenished the Ethiopian tank arsenal in recent years. The story of the T-54 and T-55 is far from finished.

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COLOR PLATE COMMENTARY

A battlefield on the Golan Heights is littered with the burned-out hulks of Syrian armored vehicles after the UN-monitored ceasefire took effect in November 1973. The vehicle nearest the camera is a T-55, while behind it is a BMP-1 infantry combat vehicle. (UN)

A: T-54B, SOVIET 20TH GUARDS ARMY, OPERATION DANUBE, CZECHOSLOVAKIA, AUGUST 1968

Soviet postwar combat vehicles were finished in an overall dark olive green close to US FS 34098. Tactical markings were typically in white. In the hours prior to the execution of Operation Danube, the invasion of Czechoslovakia in the summer of 1968, participating Soviet forces were instructed to paint a large identification marking on their tanks to prevent confusion with similar Czechoslovak equipment. This resembled a white cross when viewed from above. However, in many cases the cross did not cover every fitting, and as seen here, was confined to the large flat areas and not the turret hatches. Soviet tanks typically carried a three-digit tactical number as seen here. In addition, during operations, other tactical markings were sometimes carried. After 1944 the Soviet Army generally used complicated geometric symbols and numbers which served as a form of convoy-marking to assist in directing traffic during large operations. Usually, the shape of the geometric symbol indicated the division or higher formation, in this case a square. For this particular tank regiment, the vehicle number was carried at the top, two digits lower than the call sign on the turret. So in this case, for tank "017", the vehicle number in the box is 15. The lower set of numbers consists of an arbitrary number assigned to each battalion (10) followed by the company number (2). These markings were intentionally arbitrary to frustrate NATO intelligence.

B: T-55, 3./PSVP, FINNISH ARMY, 1981

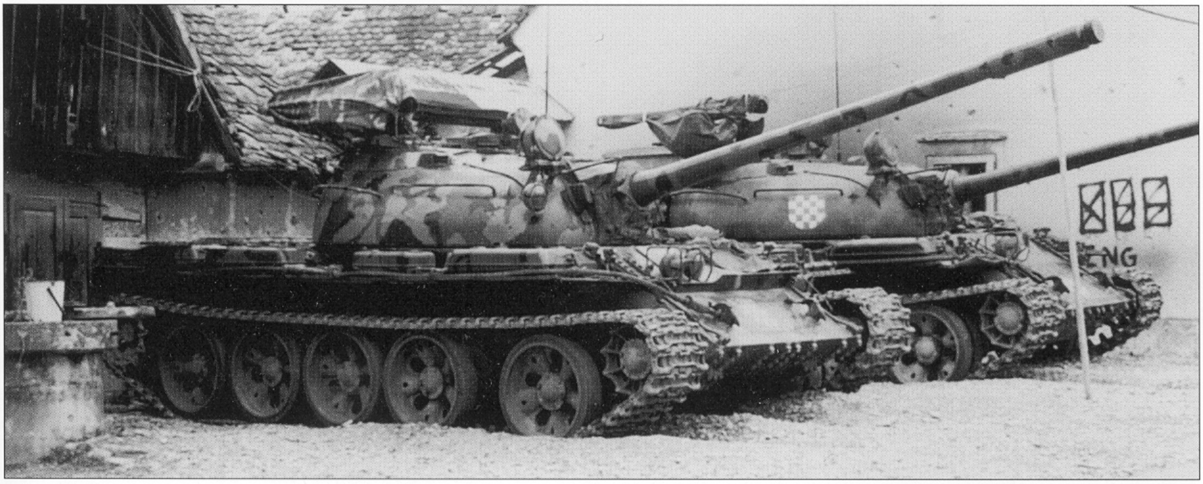
In 1981 the Finnish Army adopted a new three-tone splinter camouflage scheme consisting of *Tummanvihrea* (dark green, close to FS 34077), *Vaaleanvihrea* (light green, close to FS 34102), and Musta (black). This was painted in a standardized splinter pattern with hard edges on both the T-54 and T-55 tanks. The standard Finnish insignia was also carried as seen here. The registration numbers were painted in white on the lower lip of the glacis plate on the front, and on the lower center edge of the back plate as well. The number here was Ps 262-64, the PS indicating *Pansar* ("tank"), the 262 being the code for the T-55, and the –64 being the individual vehicle number. The T-54 registration number was 261. The national insignia, a pale blue donut inside a white disc, was carried on either side of the turret. This particular tank was assigned to the 3rd Company of the Finnish Tank Battalion.

C: TIRAN-5, 11TH RESERVE ARMORED BRIGADE, ISRAELI DEFENSE FORCE, SINAI, 1985

In the 1980s the Israeli Defense Force began to adopt a darker khaki drab color in place of the sand gray used earlier which was considered suitable for either the Sinai or Golan theaters. In the event the color tended to become faded and obscured by fine dust once in operation, giving the tanks a lighter appearance. Israeli tactical markings have never been fully explained for security reasons. The white chevron on the turret is a "spinning V" used to identify sub-units, probably companies, with the symbol pointing to 12 o'clock being the 1st company, 3 o'clock the 2nd company, etc. Tanks also carry a small unit marking usually consisting of a tactical number and symbol painted in white on a black background, in this case "2-" on the turret bin side and the right fender. The unit tactical marking is carried in white on a red background on the left fender.

D: T-55 TANK, SOVIET ARMY, 1970

See plate for full details.

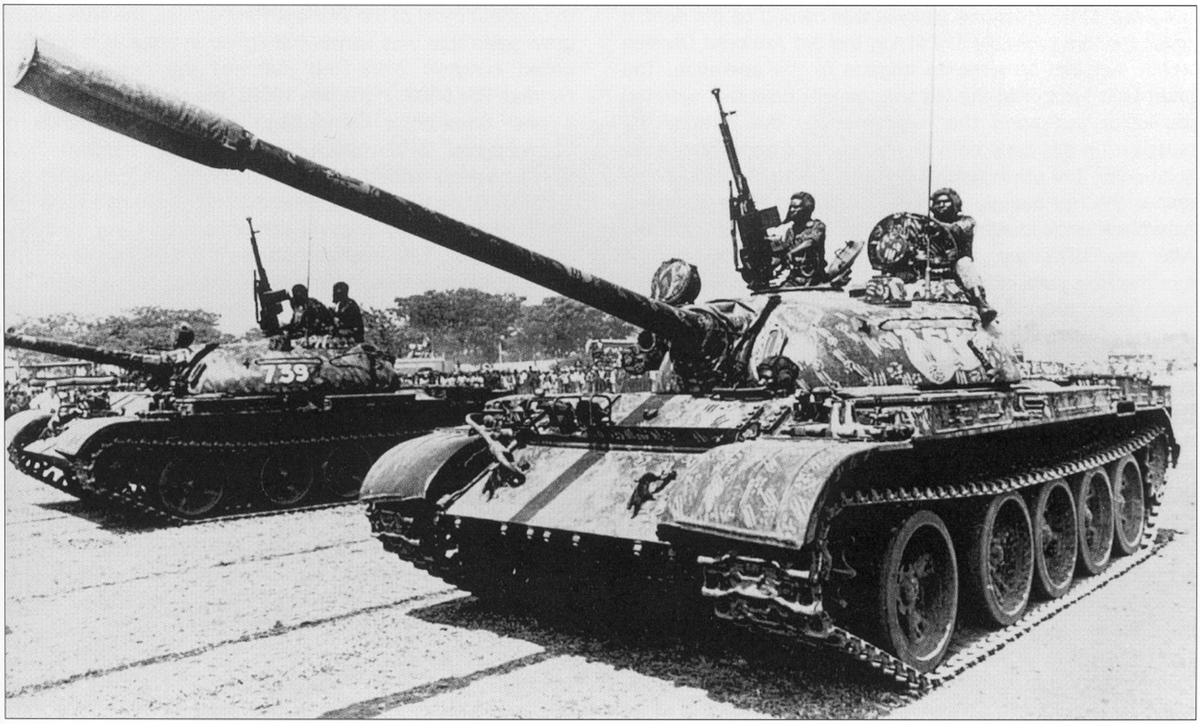


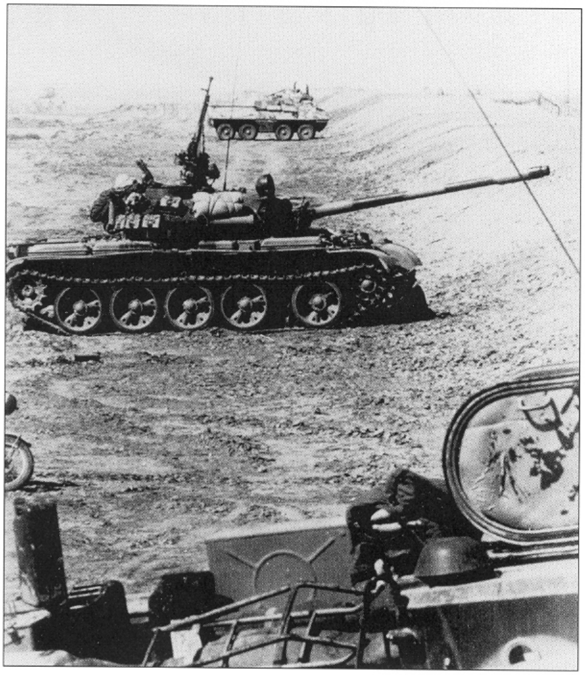
ABOVE **The T-55 formed the backbone of the prewar Yugoslav army, and during the 1990 wars in the Balkans, it was the workhorse of the various republics. These particular examples are from the Croatian army, the second vehicle wearing the Croatian red and white crest. (Henrik Clausen)**

E1: T-54M, SYRIAN 5TH INFANTRY DIVISION, RAMTHA, JORDAN, 1970

Syrian armor took part in the civil war in Jordan in 1970 supporting the Palestine Liberation Organization against the Royal Jordanian Army. The Syrian 5th Infantry Division, reinforced with two armored brigades and totaling nearly 300 T-54 and T-55 tanks, fought a savage battle with Centurion tanks of the 40th Armored Brigade, losing 62 tanks in the process. This T-54M is finished in the usual Syrian scheme of blotches of sand and gray painted irregularly over the Soviet dark olive green. The Syrian Army had a standardized set of tactical insignia for their tank formations, usually painted on a white rectangle or within a white rectangular border. This was typically carried on the lower center of the glacis plate and the center of the rear hull plate,

BELOW **The T-55 has been a fixture during wars in sub-Saharan Africa since the 1970s. This is a Polish-built T-55 in Kampala, Uganda, on parade in January 1976 in an improvised local camouflage scheme. (Janusz Magnuski)**





One of the most extensive combat episodes for the T-54 and T-55 tank was during the protracted Iran–Iraq war of 1980–88. Here, an Iraqi T-55 is seen taking cover behind a berm during the initial fighting in September 1980. In the foreground is a OT-62 armored personnel carrier (APC) and in the background is an OT-64 APC. (US DoD)

though occasionally on the turret sides as seen here. In this case (a) the divisional insignia was carried on the right, a green triangle probably identifying the 3rd Armored Division which supplied an armored brigade to the operation. The geometric symbol to the left was usually bisected, with the top color indicating the regiment and the bottom the battalion. In this case both are yellow so it appears to be a solid color. The other symbol (b) from the 1973 October war shows the red triangle of the 1st Armored Division with a blue/black circle identifying a subordinate regiment/battalion. After the 1973 war, the Syrian army began to change this marking pattern as seen here (c) from an unidentified mechanized division in the Bekaa Valley in 1982. The division is distinguished by a red rectangle on the right, and the subordinate units are identified by the new-style partitioned square to the left, with the top yellow triangle identifying the brigade, and the lower red triangle the battalion. This particular tank is a good example of a Soviet rebuild, the turret obviously being that of an old T-54-2 with its distinctive rear overhang, but with the later starfish wheels.

E2: IRAQI T-55, 1/12TH BRIGADE, 3RD SALADIN ARMORED DIVISION, OPERATION DESERT STORM, FEBRUARY 1991

In 1991 Iraqi tanks were typically painted in overall pale sand color, though sometimes this was broken up with a sprayed pattern of dark gray or other colors. The Iraqi Army used a complicated pattern of tactical insignia. The divisional insignia was the painted bore evacuator, yellow with a white stripe. The 12th Brigade of the 3rd Saladin Armored Division used a gray disc with three square pips. The outer pips identified the three brigades in white, green, and black, with black identifying the 12th Brigade as seen here. The center pip identified the sub-unit within the brigade: (a) gray, the HQ company; (b) white, the 1st Regiment; (c) black, the 2nd Regiment; (d) yellow, the 3rd regiment; and green (not shown),the Mechanized Regiment. The Arabic script above the pips is the letters "QX", signifying "Qadisyah Saddam" referring to the Muslim victory in 637 AD.

F: M-55S-1, 74TH INDEPENDENT MECHANIZED BATTALION, MARIBOR, SLOVENIA, 2000

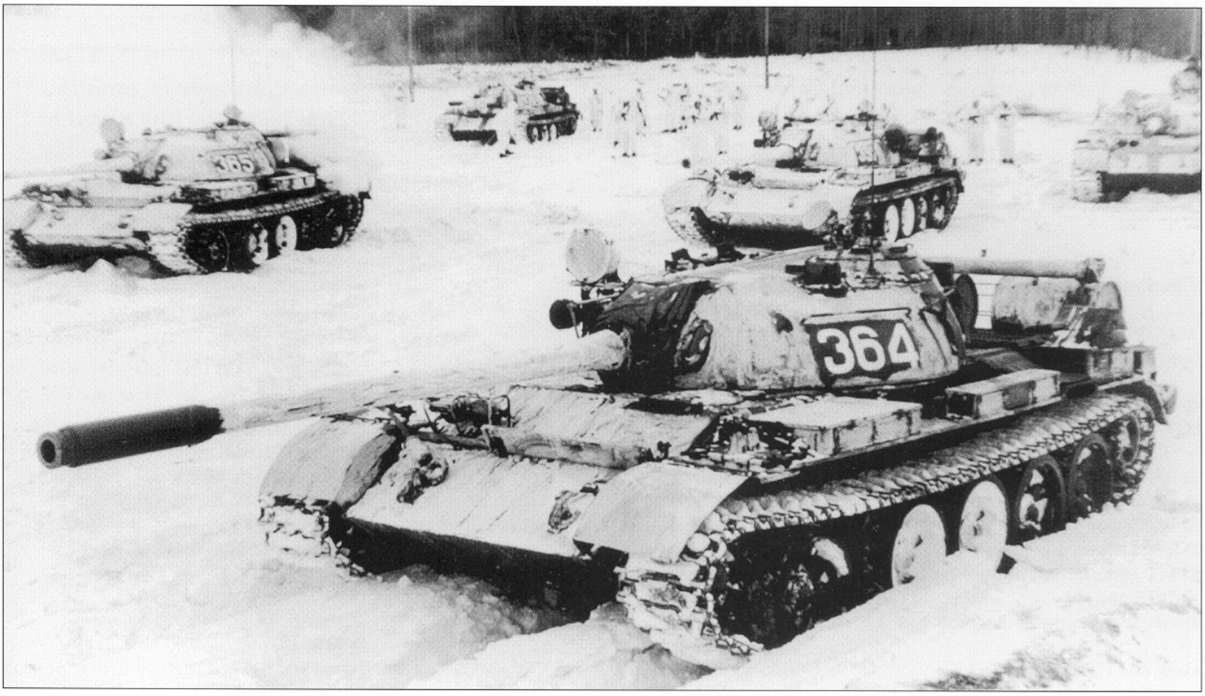
The M-55S-1 is a good example of the potential of the T-55 for life extension programs. This particular modernization effort was a joint venture between the Ravne firm in Koroskem and Israeli defense firms, using a combination of former Yugoslav upgrades such as the new track, laser warning system, and wind-sensor among others, with Israeli reactive armor and 105mm gun. When the tanks were rebuilt, they were finished in a scheme of dark olive green with sprayed-on bands of medium earth brown. Vehicle markings included the Slovenian crest in subdued colors on the turret side in front of the smoke mortars, the battalion scarab insignia in black on the lower front turret side, the vehicle registration number in white on the hull side armor (10051), and the registration number in a license plate format of black rectangle with white edge with the number SV 10-051 (the "SV" indicating Slovenian Army).

G1: T-55AM2B, NATIONAL PEOPLES ARMY (NVA), EAST GERMANY, 1989

The East German NVA had its own camouflage patterns and paint colors which made them distinctive within the Warsaw Pact. Instead of the usual dark olive green common throughout most of the Warsaw Pact armies, the NVA used a gray-green that was somewhat lighter in color. It is officially called *Olivgrun* 2425 and matches the current Federal German RAL6003. In the late 1980s, the NVA began to adopt a new three-color camouflage scheme with bands of *Schwarzgrau* 2402 (black-gray) and *Dammergrau* 2403 (medium-gray) added over the usual green color. On the T-55AM2B this was first applied over the entire tank, but later conversions usually skipped camouflage-painting the black plastic skirts. This example shows the initial pattern. The national insignia was carried on the front "brow" appliqué armor. These Bastion tank conversions were completed shortly before the collapse of the East German government, and so are seldom seen with the usual white tactical numbers.

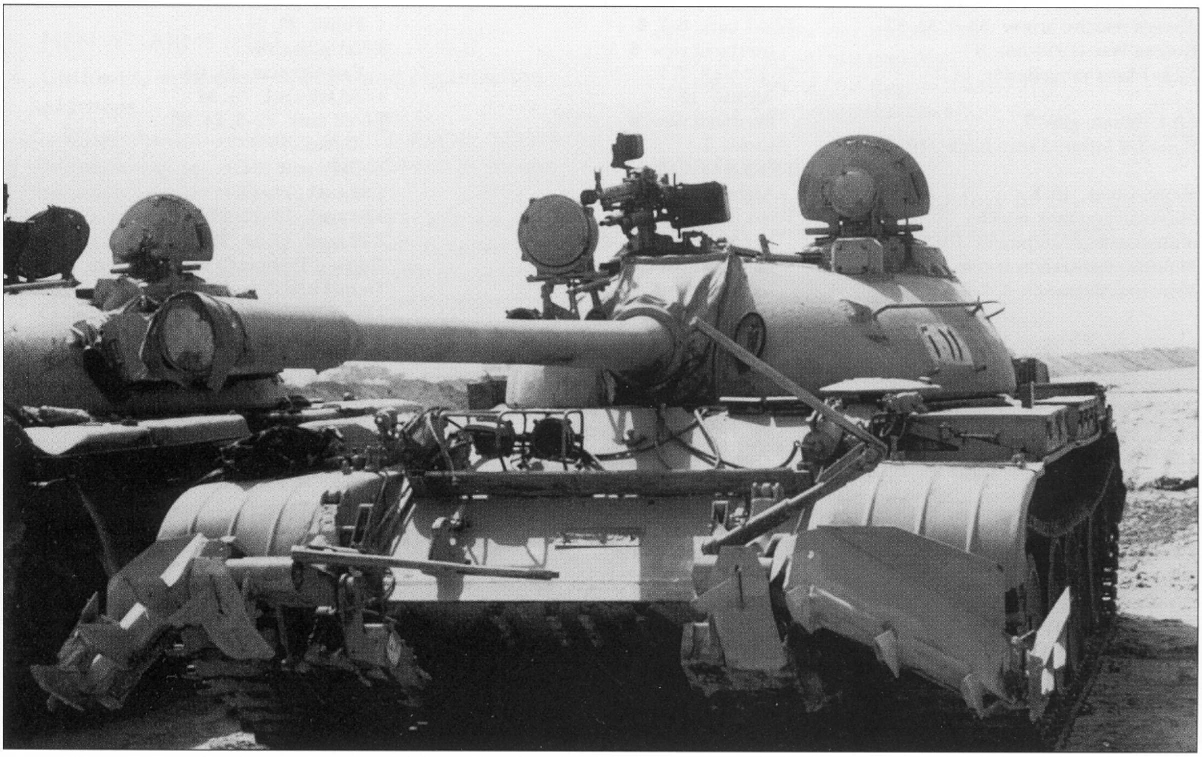
G2: TR-85M1, ROMANIAN ARMY, 2000

This is a good example of how far the evolution of the T-55 has progressed. Romania's TR-85 tanks were already quite distinct from the normal T-55 due to their new suspension and German engine, but the TR-85M1 upgrade takes this even further, adding a new gun, rear turret bustle, appliqué armor, new fire controls, and a host of other features. The color scheme is indicative of Romania's interest in joining NATO, being a local variation of the current NATO three-tone scheme of dark green, chocolate brown and black. So far, these upgrades have not been done in significant numbers so the tank lacks the usual tactical insignia.



ABOVE **The T-55 tank was standardized from the many improvements of the T-54B and was given another series of upgrades aimed at improving its survivability on the nuclear battlefield. Here, a company of T-55 tanks are seen during winter maneuvers in the 1970s.**

BELOW **This Iraqi T-55 is seen in the wake of the 1991 Gulf War after being captured by British forces. It is a Polish-manufactured tank with the more oval cover over the gunner's telescope aperture, and is fitted with the standard KMT-6 mine rake system. (US DoD)**



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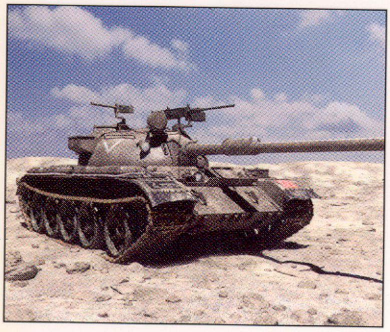

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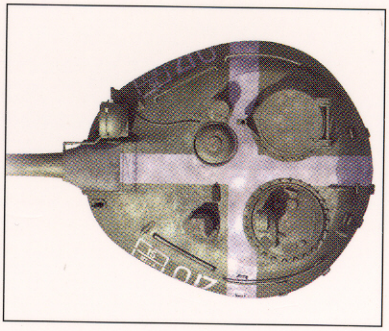

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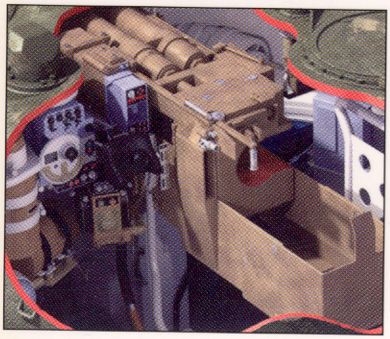

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T-54 and T-55 Main Battle Tanks 1944–2004

The T-54 and T-55 tanks are the most widely manufactured tanks of all time. They have become ubiquitous to wars around the globe since the 1950s, including the Arab-Israeli wars, the Vietnam War of 1967–75, the Iran–Iraq War of 1980–88, Operation Desert Storm, the Yugoslav Civil Wars, Afghanistan and Operation Iraqi Freedom. This book examines the roots of this prolific tank family, starting with the Soviet Army's first attempts to replace the legendary T-34 during World War II, and covering the T-43 and the T-44, the more successful T-54, and its ultimate evolution into the T-55.

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